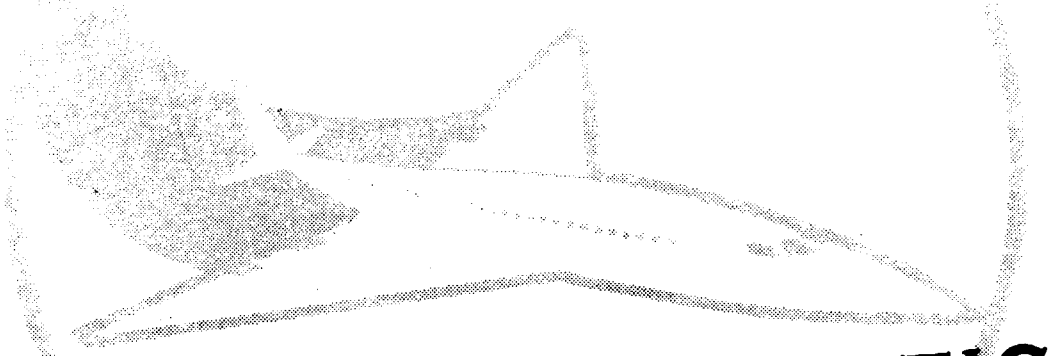
AWOS Data Acquisition System (ADAS) Operational Test and Evaluation (OT&E) Integration and OT&E Operational Test Report

Michael Greco
Eric Hoover



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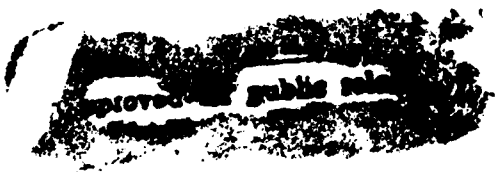

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16. Abstract

The Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) is a planned element of the National Airspace System (NAS) modernization program. The objective of the ADAS is to provide collection, processing, archiving, and distribution of aviation-oriented weather observation data in support of the NAS. This report presents the results of the ADAS Operational Test and Evaluation (OT&E) Integration and OT&E Operational testing performed at the Federal Aviation Administration (FAA) Technical Center between December 1992, and July 1993.

All ADAS interfaces have been thoroughly tested either through simulation or integrated with live NAS subsystems. During OT&E testing, the ADAS was interfaced with live AWOSs and Automated Surface Observation Systems (ASOSs), and also the National Airspace Data Interchange Network II (NADIN II), Weather Message Switching Center Replacement (WMSCR), Coded Time Source (CTS), and Maintenance Processor Subsystem (MPS). The MPS was executing testcom software in lieu of operational Interim Monitor Control Software (IMCS). The Real-Time Weather Processor (RWP), Data Link Processor (DLP), and Local Communications Network (LCN) interfaces were partially verified using the ADAS prime development contractors' Interactive Process Simulator (IPS). (See ADAS Development Specification, FAA-E-2804A, for a description of the IPS.)

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EXECUTIVE SUMMARY

The Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) is a planned element of the National Airspace System (NAS) modernization program. The objective of the ADAS is to provide collection, processing, archiving, and distribution of aviation-oriented weather observation data in support of the NAS. This report presents the results of the ADAS Operational Test and Evaluation (OT&E) Integration and OT&E Operational testing performed at the Federal Aviation Administration (FAA) Technical Center between December 1992, and July 1993.

All ADAS interfaces have been thoroughly tested either through simulation or integrated with live NAS subsystems. During OT&E testing, the ADAS was interfaced with live AWOSs and Automated Surface Observation Systems (ASOSs), and also the National Airspace Data Interchange Network II (NADIN II), Weather Message Switching Center Replacement (WMSCR), Coded Time Source (CTS), and Maintenance Processor Subsystem (MPS). The MPS was executing testcom software in lieu of operational Interim Monitor and Control System (IMCS) software. The Real-Time Weather Processor (RWP), Data Link Processor (DLP), and Local Communications Network (LCN) interfaces were partially verified using the ADAS prime development contractors' Interactive Process Simulator (IPS). (See ADAS Development Specification, FAA-E-2804A, for a description of the IPS.)

Weather messages were successfully transmitted to ADAS from both AWOS and ASOS stations in both point-to-point and multidrop configurations. The ADAS communicated satisfactorily with two FAA Technical Center NADIN II nodes, and properly transmitted "live" and emulated weather messages to the WMSCR in Atlanta, GA, via two interconnected NADIN II nodes. The ADAS also has successfully communicated with the FAA Technical Center MPS via two FAA Technical Center NADIN II nodes, reporting alarms/alerts/(returns) (RTNs) as they occur and sending ADAS status and performance parameters in response to MPS commands.

A String test was successfully conducted during which ADAS transmitted "live" and emulated AWOS and ASOS weather data to WMSCR concurrent with ADAS sending reports to the MPS and responding to MPS commands.

The ADAS cannot presently communicate with the Data Link Processor (DLP) due to a deficiency in the DLP present Build 1 software. However, it is currently planned that this deficiency will be corrected by the DLP Build 2, which will supersede Build 1. The four multidropped ASOS stations operate successfully for varying periods (sometimes days) before failing. It is believed this is not an ADAS deficiency, but rather a problem(s) with the circuit/bridge and/or the ASOS stations.

The ADAS was found to be fully compliant with all four NAS-SS-1000 requirements to accept input from CTS, by using a live CTS signal.

The ADAS was also found to be fully compliant with all 10 requirements regarding the acceptance of weather input data from AWOS, ASOS, and Automated Observing Systems (AOS). This was achieved through testing with a combination of live and simulated weather data inputs.

The ADAS weather processing-related requirements were exercised using the IPS. Test results show that ADAS is fully compliant with 18 of 22 NAS-SS-1000 requirements in this category. However, the other four have been verified as failures, which relate to the areas of visibility, urgent specials, and hazardous weather classification.

Data dissemination requirements were tested using a combination of live and simulated interfacing subsystems (as described above). Test results show that ADAS is fully compliant with 14 of 24 dissemination requirements. However, ADAS was found NOT to be fully compliant with the other 10 requirements, which relate to the areas of accumulated precipitation, pressure tendency, and synoptic ambient temperatures.

Finally, the ADAS 15-day archive function was tested using both simulated and live Synoptic Aviation Observation (SAO) format data, which indicated that ADAS is fully compliant with all four NAS-SS-1000 requirements for this category.

In all cases where the ADAS is not in full compliance with NAS-SS-1000 requirements, a Problem Trouble Report (PTR) has been generated, and the project office has been notified. ACW-200A will track the resolution of the PTR to insure compliance with NAS-SS-1000 requirements.

1. INTRODUCTION.

The Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) is a planned element of the National Airspace System (NAS) modernization program. The objective of the ADAS is to provide collection, processing, archiving, and distribution of aviation-oriented weather observation data in support of the NAS.

1.1 PURPOSE OF REPORT.

The purpose of this document is to provide details of the tests performed to verify the operational effectiveness, suitability, compatibility, and interoperability of the ADAS, and to identify any ADAS deficiencies in the subsystem when fully integrated into a live/simulated NAS environment.

1.2 SCOPE OF REPORT.

This document describes the results of the tests conducted during both formal Operational Test and Evaluation (OT&E) Integration and OT&E Operational testing of the ADAS delivered to the Federal Aviation Administration (FAA) Technical Center. The test procedures used are documented in the ADAS OT&E Test Procedures document, dated November 13, 1992, and approved by the ADAS Program Office, ANW-400. The ADAS OT&E Integration Test Plan provides the plans for the ADAS testing, the verification philosophy, and definitions of the tests to be performed.

2. DOCUMENTS.

The following is a list of the applicable documentation and reference materials used in development of these procedures and applicable to the ADAS OT&E Integration and Operational testing.

2.1 FAA SPECIFICATIONS.

FAA-E-2804A	AWOS Data Processing System (ADAS) System Specification, October 18, 1991.
FAA-E-2770b	Specification National Airspace Data Interchange Network Packet Switched Network, April 29, 1988.
NAS-SS-1000	NAS System Specification Functional and Performance Requirements for the National Airspace System (Volumes I-V), October 19, 1992.
NAS-SR-1000	National Airspace System Requirements Specification, November 27, 1991.
NAS-MD-110	Test and Evaluation (T&E) Terms and Definitions for the National Airspace System, March 27, 1987.
NAS-DD-1000E	NAS Design Level Document, August 1992.

2.2 FAA STANDARDS.

FAA-STD-024a	Preparation of Test and Evaluation Documentation, August 17, 1988.

2.3 FAA ORDERS.

1810.4B	FAA NAS Test and Evaluation Policy, October 22, 1992.

2.4 OTHER FAA DOCUMENTS.

ADAS MTP	ADAS Master Test Plan, May 27, 1993.
ADAS OT&E	ADAS OT&E Test Plan, March 6, 1992.
ADAS OT&E ITPR	ADAS OT&E Test Procedures, November 13, 1992.

2.5 OTHER DOCUMENTS.

NAS-IC-25082513	DLP/ADAS Interface Control Document (ICD), March 6, 1991.
NAS-IC-25082507	WMSCR/ADAS ICD, August 20, 1990.
NAS-IC-25084302	ADAS/NADIN ICD, November 8, 1990.
NAS-IC-25083101-03	AWOS/ADAS ICD, Rev. C, August 28, 1990.
NAS-IC-21020000	LCN/ADAS ICD, September 27, 1991.
NAS-IC-25082511	RWP/ADAS ICD, August 20, 1990.
NAS-IC-51030002	ADAS/MPS ICD, July 24, 1991.
NAS-IC-25089202	CTS ICD, November 1, 1990.
NAS-IR-44010001	TE/Digital IRD, June 16, 1987.
NAS-IR-61002508	ACF/ADAS IRD, July 18, 1989.
ISO/OSI 7498	International Standards Organization Standard for Open System Interface, October 15, 1984.
FCM-S2	Standard Formats for Weather Data Exchange Among Automated Weather Information Systems, May 1990.
FCM-S3	Standard Telecommunications Procedures for Weather Data Exchange Among Automated Weather Information Systems, July 1989.

3. SYSTEM DESCRIPTION.

3.1 MISSION REVIEW.

The mission of the ADAS is to be part of the Area Control Facility (ACF), and to provide the processing required to collect, store, and distribute the weather observations produced by FAA, DOD, and non-Federally-owned AWOS and National Weather Service (NWS)-owned ASOS.

3.1.1 Critical Functions.

The OT&E Integration and Operational Test Plan identified critical requirements for each test category. Except for Category A, ACW-200A has identified one requirement in each category which reflects the critical mission functions. All the requirements in Category A have been identified as critical requirements. The other requirements reflecting critical functions of the ADAS are:

Category B:	3.2.1.1.4.1a	Accept weather information from external subsystem that support NAS specialists and users.
Category C:	3.2.1.1.4.1.g	Classify weather information as hazardous which may impact flight operations.
Category D:	3.2.1.1.1.1.h	Disseminate aeronautical/weather data to the user that directly affects flight operations.
Category E:	3.2.1.1.4.1.n	Archive weather information for use in event reconstruction and accident investigation.
Category F:	3.2.1.1.7.1.a	The NAS shall continually monitor subsystem performance to obtain the data needed by specialists for maintenance and operations support.

3.2. TEST SYSTEM CONFIGURATION.

The ADAS test bed was configured to the needs of each test performed. Diagrams of each test bed configuration are provided in appendix A of this report. The configuration used by each test is listed in the test conduct subparagraph in each test objective paragraph below.

3.3 INTERFACES.

The interfaces tested were the following:

3.3.1 Coded Time Source (CTS)/ADAS

3.3.2 Automated Weather Observation System (AWOS)/ADAS

3.3.3 Automated Surface Observing System (ASOS)/ADAS

3.3.4 Maintenance Processor Subsystem (MPS)/ADAS via NAS Data Interchange Network II (NADIN II)

3.3.5 Weather Message Switching Center Replacement (WMSCR)/ADAS via NADIN II

3.3.6 Data Link Processor (DLP)/ADAS (simulation provided by the Interactive Process Simulator (IPS))

3.3.7 Real-Time Weather Processor (RWP)/ADAS (simulation provided by the IPS)

3.3.8 String Test: Acquisition by ADAS of live and IPS-simulated AWOS and ASOS weather data traffic and transmission of same to WMSCR via NADIN II concurrent with MPS/ADAS exchange of commands and status/alarm messages.

4. TEST DESCRIPTION.

4.1 TEST SCHEDULE AND LOCATIONS.

The majority of noninterface testing occurred between December 15, 1992, and January 6, 1993. Interface testing took place during the period February 1, through July 9, 1993. String testing occurred from July 12, through July 16, 1993. All testing took place at the FAA Technical Center.

4.2 PARTICIPANTS.

Trained FAA test personnel conducted all tests. ACW-200A and ACN-100D were responsible for conducting OT&E testing activities.

The conduct of ADAS OT&E testing required the following personnel support:

a. Associate Program Manager for Test (APMT). The APMT (ACW-200A) is ultimately responsible for the overall management of the ADAS OT&E test effort. The APMT has ultimate responsibility for (1) developing OT&E test requirements, plans, procedures, and reports; (2) coordination of test documentation; (3) conduct of OT&E testing; (4) manpower and test equipment acquisition; (5) test documentation management; (6) appointment of Test Manager; (7) presenting unresolved test issues and problems to the Test Policy Review Committee (TPRC); and (8) providing assessments and recommendations to the Deployment Readiness Review Executive Committee (DRR EXCOMM).

b. Test Manager. Responsible for upholding test schedules and maintaining authority at the test site during test conduct. Also responsible for ensuring that (1) test personnel are available and properly trained to conduct the required

tests; (2) the required equipment was available and in working order at the designated test site; (3) requirements for on-site test support personnel were coordinated; (4) test activities were performed within the approved schedule in accordance with approved test plans and procedures; (5) noted test discrepancies were logged and appropriate remedial action for resolution of the test problems was recommended; and (6) test data for analysis was collected and test results were documented.

c. Lead Test Engineer. Responsible for briefing the test team, defining the necessary test team assignments, coyordinating the test resources, assuring proper recording of the test results, red-lining test procedures to reflect as-tested activities, coordinating Trouble Reports, debriefing the test team, and participating in test execution with test engineers.

d. Test Engineer(s). Responsible for performing and fulfilling various test duties during the conduct of testing, and recording anomalies and comments in the test log during test conduct. Responsibilities include bringing up the system; carrying out test setups and execution runs; ensuring hard copies of required test output data were printed and available; providing support in all data reduction tasks (required for analysis of the test results); and operating the test equipment.

4.3 TEST EQUIPMENT.

This section describes the hardware and software required during the execution of the ADAS OT&E Test Procedures.

4.3.1 Software.

The procedures required that both the ADAS and the IPS contain the UNIX system software and their respective application software. The ADAS OT&E Input/Output (I&O) test bed configurations utilized an Operational ADAS System (OAS) and Operational IPS System (OIS). The software versions baselined for OT&E I&O were as follows:

a. UNIX Basic Operating System (BOS) - Motorola's System V/68 R3V6.2,

b. Basic Utilities and Extensions (BUE) - Communications and Power Engineering, Inc.'s (CPE) BUE version 1.98.1,

c. ADAS Software - CPE's Operational ADAS System (OAS), version 1.92,

d. IPS Software - CPE's Operational IPS System (OIS), version 1.92.

The procedures also required the Digilog 900 Protocol Analyzer be configured to decode High Level Data Link Control (HDLC) and X.25 protocol communications.

4.3.2 Hardware.

The tests utilized the following hardware items:

a. An Operational ADAS - Item Under Test,

b. An IPS - provided a means of simulating all of the external subsystems which interface with the ADAS,

c. A Digilog 900 Protocol Analyzer - provided a means for monitoring and recording data communication activities between the ADAS and the external subsystems,

d. An Operational CTS - provided the Coordinated Universal Time (UTC) for ADAS time synchronization,

e. Operational AWOSs - provided weather data to the ADAS,

f. Operational ASOSs - provided weather data to the ADAS (Note: operates identical to an Automated Observing System (AOS); use of an ASOS therefore allows verification of the AOS-related requirements),

g. Operational NADIN Packet Switched Network (PSN) Nodes - provided a communications path between the ADAS and end users of ADAS data,

h. A Live DLP - an end user of ADAS data,

i. A Live MPS - an end user of ADAS data,

j. A Live WMSCR - an end user of ADAS data.

The IPS was used to simulate the messages generated by the AWOS and ASOS subsystems for many of the tests in categories B, C, D, and E to provide a known set of data inputs. The IPS was also used to simulate the DLP, MPS, NADIN II, RWP, and WMSCR to allow capture of the ADAS output to these subsystems. The IPS was used to simulate the RWP in all tests except those involving a live NADIN II interface since there was no live RWP available.

4.4 TEST CATEGORIES.

4.4.1 Test Category A: Functional and Physical Setup.

This section addresses the Category A high-level test objectives, overall test approach, and test requirements.

4.4.1.1 Category A Test Objectives (High Level).

The objectives of the tests in this category were to verify the following:

a. The electrical and mechanical (physical layer/level) interconnections of the ADAS to its external subsystems including cabling, connectors, and electrical signaling,

b. The implementation of the protocols ADAS uses to communicate with these subsystems. These protocols involve the link layer for all interfaces and higher layers for some.

These tests verified (1) that data is correctly transferred between the subsystems in the test configuration, and (2) that the ADAS connection and data transfer to each of its interfaces is in accordance with the NAS-SS-1000 System Specification (Volume II) and the Interface Control Document (ICDs) derived from this specification.

4.4.1.2 Overall Test Approach.

Testing of each interface was done with the actual user/station when available. If not available for a particular interface, the IPS emulation of that interface was employed for initial testing with subsequent testing for that interface performed as soon as the actual user/station became available. Also, IPS simulations (Sequences Groups/Sequence Files) were used to concurrently supplement live interface testing by generating variations of the interface protocols which are or may be in addition to those encountered with live interfaces and would be used to verify prior correct receipt of these messages by ADAS. For example, AWOS format messages received by ADAS are forwarded without modification (i.e., "pass-through" processing) to NAS users such as the DLP.

The Digilog Model 900 and the LM1 line monitor/protocol analyzers (LMPAs) were used to (1) display interface link traffic for monitoring during testing, and (2) to store this traffic for subsequent dumping/printing for post-test analysis.

The Digilog Model 900 was far more useful since it incorporated the necessary receivers/drivers circuitry to effectively provide an in-series connection to its monitoring capability as contrasted with the LM1 which necessitated a parallel connection from/to the data link it was monitoring. (The parallel connection proved unworkable since the Communications Transition Module (CTM) could not provide the additional current required of the parallel connection.) Verification that the interfaces complied with the physical (electrical/mechanical) and the communication protocol requirements stipulated in the NAS-SS-1000 Specification and the ICDs derived from this specification was achieved by the following:

a. Configuring (including making the connections) the test bed with components in compliance with the above specification and ICDs.

b. Monitoring the control/data information on the Digilog LMPA to determine degree of compliance with the appropriate ICD.

c. Dumping (printing) the above information from the Digilog LMPA and inspecting to determine degree of compliance with the appropriate ICD.

d. Inspecting the IPS logs for the (simulated) DLP and RWP to determine that the live AWOS format messages had been correctly received and delivered by ADAS.

e. Examining the ADAS error log for messages incorrectly received.

f. Discussion with MPS and WMSCR personnel and inspection of products generated at these subsystems during the testing to confirm that the messages transmitted by ADAS were correctly received.

As the testing progressed, it became important to monitor multiple links concurrently. This was achieved by establishing a multiple switch configuration which permitted rapid (manual) connection of:

a. different ADAS Input/Output Controllers (I/OC) to the Digilog LMPA,

b. the output of this LMPA to either the NADIN link or to anyone of the modems on an AWOS or ASOS circuit.

The following actual "live" interfaces were available for testing:

a. One circuit connecting to two AWOS stations, one circuit connecting to one AWOS station, one circuit connecting to four ASOS stations, and one circuit connecting to one ASOS station. Since only 1 live circuit entailed as many as 4 stations/drops, 1 phase of communications testing included IPS emulated circuits many of which will have 5 to 10 drops. This enabled the evaluation of the capability of the ADAS software to cope with concurrent traffic involving many I/O Communications Controller (ICC)s and many I/O channels with some of the I/O channels handling as many as 10 drops each.

b. NADIN II and two subsystems interfaced to ADAS via NADIN II; the MPS and the WMSCR. A four-phase approach to testing these interfaces was employed. Phase I entailed testing the ADAS/NADIN II node A (connected only to FAA Technical Center subscribers) interface. Phase II entailed testing the ADAS/MPS interface via the NADIN II node A. Phase III involved the testing of the ADAS/WMSCR interface via the NADIN node B (connected to FAA Technical Center subscribers and the NADIN II node in Atlanta, GA. Phase IV entailed the string testing of the ADAS concurrently communicating via the NADIN II node B with the MPS and with the WMSCR while at the same time communicating with live and emulated AWOS and ASOS stations.

This four-phase approach enabled, prior to interconnection with the full-scale NADIN II network, the progressive, systematic evaluation of the compatibility of the ADAS implementation of all protocol layers with the implementation of these layers by each of the two user subsystems, and the determination/certification of the ADAS compliance with the NADIN II interface requirements.

c. The DLP Coded Time Source (CTS).

4.4.1.3 Category A Test Requirements.

Table 4.4.1.3-1, which follows, furnishes the paragraph numbers of the NAS-SS-1000 System Specification, Volume II, stipulating the requirements for each of the ADAS interfaces. The specific information contained in these (NAS-SS-1000) paragraphs is shown in Part 1 (Requirement Descriptions) of appendix B (to this document) Test Verification Requirements Traceability Matrix (TVRTM). Part 2 (Requirement Characteristics) of appendix B designates, for each of the ADAS interfaces (identified by the NAS-SS-1000, Volume II paragraph numbers), the verification method and the corresponding paragraph of this (OT&E Test Procedures) document. Table 4.4.1.3-1 also shows the ADAS Integration Test Configuration (ITC) used in testing each of the interfaces.

TABLE 4.4.1.3-1. CATEGORY A NAS-SS-1000 REQUIREMENTS

Paragraph No.	Volume	ADAS ITC	Relates to
3.2.3.1	I	N\A	Fault Detection/ Fault Isolation (FD/FI) to LRU 95 percent
3.3.1	I	N\A	FAA-G-2100
3.3.6.1.a	I	N\A	Degradation and Inc. Risk
3.3.6.1.b	I	N\A	MIL-STD-882
3.3.6.2	I	N\A	Code of Federal Regulation Title 29
3.3.7	I	N\A	MIL-H-46855 and MILD-STD-1472
3.5.1	I	N\A	NAS and FAA Order 6000.30
3.6.1	I	N\A	Trained Personnel
3.6.2	I	N\A	Training Equipment and Facilities
3.2.1.5.8.3.a	II	5	CTS Interface (I/F)
3.2.1.5.8.3.b	II	2	AWOS/ASOS I/F
3.2.1.5.8.3.c	II	5 & 6	DLP I/F
3.2.1.5.8.3.d	II	2	DOD AWOS I/F
3.2.1.5.8.3.e	II	5 & 6	MPS I/F
3.2.1.5.8.3.f	II	5 & 6	MPS I/F
3.2.1.5.8.3.g	II	2	NFED AWOS I/F
3.2.1.5.8.3.h	II	5 & 6	RWP I/F
3.2.1.5.8.3.i	II	5 & 6	WMSCR I/F

4.4.2 Test Category B: Data Input.

Category B testing addressed the NAS-SS-1000 ADAS requirements relating to the collection of information from external subsystems. This section addresses the Category B high-level test objectives and test requirements, followed by a more detailed discussion of each test performed in this category.

4.4.2.1 Category B Test Objectives (High Level).

The objectives of the two tests in this category were to verify that the ADAS is capable of accepting data from the CTS, AWOS, and ASOS subsystems. The first test verified that the ADAS can synchronize to the UTC input. The second test verified that the ADAS can accept data at a sufficient rate from up to 137 AWOS/ASOS/AOSs.

4.4.2.2 Category B Test Requirements.

Table 4.4.2.2-1, which follows, furnishes specific paragraph numbers of the NAS-SS-1000 Systems Specification requirements for the ADAS address by the Category B verification procedures. The specific information related to these paragraph numbers appear in the ADAS OT&E Integration Test Plan (TVRTM).

TABLE 4.4.2.2-1. CATEGORY B NAS-SS-1000 REQUIREMENTS

Paragraph No.	Volume	ADAS ITC	Relates to
3.2.1.1.4.1.a	I	2	External subsystem
3.2.1.1.4.1.b	I	2	Area of responsibility
3.2.1.1.4.1.e	I	2	Annotations and commands
3.2.1.2.4.a.4.d	I	2	NWS observations
3.2.1.2.4.a.5	I	2	DOD observations
3.2.1.2.8.4.b	I	1 & 7	6 Second Sync
3.2.1.2.8.4.c	I	1 & 7	CTS I/F and Synchronization
3.2.1.5.8.1.1	II	2	Observation sources
3.2.1.5.8.1.7	II	1 & 7	UTC input
3.2.1.5.8.2.1.1.a	II	2	Maximum input rate
3.2.1.5.8.2.1.1.b	II	2	NWS ASOS input
3.2.1.5.8.2.1.2	II	2	Maximum AWOS sites
3.2.1.5.8.2.3	II	2	Data base update rate
3.2.1.5.8.2.8	II	1 & 7	Time synchronization

4.4.2.3 Test B1: UTC Synchronization: Simulated CTS.

This test addressed the capture of UTC data from a "simulated" CTS subsystem. This test was not performed, however, since a live test is deemed to be more valuable in verifying test requirements. Test B2, which tests the same requirements as B1 (see below), was performed in lieu of test B1 since a live CTS input was available at the FAA Technical Center ADAS laboratory to support the ADAS OT&E effort.

4.4.2.4 Test B2: UTC Synchronization: Live CTS.

This test addressed the capture of UTC data from a live CTS subsystem.

4.4.2.4.1 Test Objectives.

The objective of this test was to verify that ADAS could synchronize with CTS, remain synchronized to within 6 seconds of CTS while connected to it, and also resynchronize to within 6 seconds of CTS after being disconnected and reconnected.

4.4.2.4.2 Test Requirements.

This test sequence addressed the following requirements:

I:	3.2.1.2.8.4.b	ADAS shall be synchronized to within 6 seconds of UTC;
I:	3.2.1.2.8.4.c	ADAS shall provide interfacing capabilities to the coded time signal and synchronization in accordance with Volumes II through V of NAS-SS-1000;
II:	3.2.1.5.8.1.7	Receive and maintain system timing synchronized to UTC to support archiving, database maintenance, and dissemination;
II:	3.2.1.5.8.2.8	Synchronize to the NAS standard time reference in^R accordance with section 3.2.1.2.8.4 in Volume I of NAS-SS-1000. Be capable of 1-second timing resolution.

These requirements were considered to be fully verifiable by this test since a real CTS signal was used to provide live UTC data.

4.4.2.4.3 Test Conduct Method.

Test bed configuration ADAS ITC 7, depicted in appendix C, was used for test B2_CTSL. The ADAS software configuration file used for this procedure was 17. (See the ADAS OT&E Test Procedure document for a description of each configuration.) The IPS was used to provide simulation of all interfacing subsystems except for CTS, which was live. The IPS also provided operator prompts for disconnection and reconnection of the CTS cable.

The UNIX Setlog and Tail functions were used to monitor the CTM Computer Software Component (CSC) time comparison data during the test. Ninety seconds after the start of the test, the IPS notified the test operator to manually disconnect the CTS cable. After disconnecting the cable, the test operator logged on to the ADAS

as root and changed the system time by negative 5 seconds to simulate an ADAS/CTS time drift. Sixty seconds later, the IPS prompted the test operator to reconnect the CTS cable. The test continued for another 2 minutes after the cable had been reconnected.

This test was also repeated, using a change in system time of plus 31 seconds.

Specific step-by-step test procedures for this test are provided in the ADAS OT&E Test Procedure document.

4.4.2.4.4 Data Collection and Analysis Method.

The key data collected to show compliance with the CTS-related requirements included:

a. a printout of the ctm_err.log activity (time comparison data),

b. event type 9's and 10's from the ADAS event log,

c. a printout of the ADAS archive data,

d. a sampling of messages received at the WMSCR simulator in the IPS.

The ctm_err.log data was reviewed for the indication of ADAS and CTS synchronization, the disconnection of the CTS, the changing of the ADAS system time, and subsequent reconnection of the CTS. Once per minute, the ADAS performs a comparison of its internal system time to the incoming CTS time. This comparison is shown in the ctm_err.log printout, along with the ADAS-calculated time difference between ADAS and CTS (i.e., ADAS time minus CTS time). The ctm_err.log activity was reviewed for an indication of a time update. The time stamps of all activities during the test were reviewed to ensure that the test operator actions and time stamped system activities were correctly related (i.e., event type 10 entries for the CTS interface enabled-active or enabled-failed, produced by the CTS cable disconnect). Also, the event 9 (ADAS time reset) time stamp was checked for reasonableness with the times in the ctm_err.log printout.

Other CTS requirements were verified by noting that the ADAS receives and maintains system timing synchronized to UTC, to support data archiving, database maintenance, and dissemination. For this purpose, the time stamps in the ADAS Synoptic Aviation Observation (SAO) archive data and WMSCR input data were reviewed for reasonableness.

4.4.2.5 Test B3: Weather Input - Simulated and Live.

This test addressed the capture of weather data from both simulated and live AWOS and ASOS subsystems.

4.4.2.5.1 Test Objectives.

The objective of this test procedure was to verify that ADAS could satisfy the weather input-related requirements specified by NAS-SS-1000, using both live and simulated inputs from AWOS and ASOSs. These include the requirements for ADAS to collect AWOS, ASOS, and AOS data, once per minute, from up to 137 sites (e.g., AWOSs) per ADAS.

4.4.2.5.2 Test Requirements.

Test B3 addressed the following requirements:

I:	3.2.1.1.4.1.a	Accept weather information from external subsystems that support NAS specialists and users;
I:	3.2.1.1.4.1.b	Collect and/or sense weather information that pertains to the area of NAS responsibility for terminal and en route operations;
I:	3.2.1.1.4.1.e	Accept input from specialists including annotations or remarks to existing weather information or commands to generate specific weather products;
I:	3.2.1.2.4.a.4.d	Collect NWS generated current weather observations, at least once every minute;
I:	3.2.1.2.4.a.5	Collect DOD generated data on current surface weather observations at least once every minute;
II:	3.2.1.5.8.1.1	Collect data from Federal, non-Federal, and DOD AWOS and NWS ASOS.
II:	3.2.1.5.8.2.1.1.a	Accept data from Federal, non-Federal, and DOD AWOS at a maximum rate of once per minute per site.
II:	3.2.1.5.8.2.1.1.b	Accept data from NWS ASOS at a maximum rate of once per minute per site, plus hourly and special observations in SAO format.
II:	3.2.1.5.8.2.1.2	Accept data from up to a maximum of 137 sites per ADAS.
II:	3.2.1.5.8.2.3	Be capable of updating ADAS database at such rates as to be able to receive 137 surface observations per minute.

These requirements could be fully verified by this test since the weather input data used for analysis was from both simulated and live AWOSs and ASOSs. Note that all AOS (DOD ASOS) and non-Federal AWOS requirements were exercised by test B3, since they are identical to the live ASOS and AWOS (respectively) used for this test.

4.4.2.5.3 Test Conduct Method.

This test was performed in two parts. The first was conducted using the IPS to simulate the inputs from 137 weather sensors (68 AWOS, and 69 ASOS). The second was performed by gathering samples of data that resulted from live ADAS/AWOS interface testing (Category A). The live data was gathered to add credibility to the part of the test using pure simulation. This provided the data set needed for full verification of the Category B test requirements.

The following is a discussion of the test method used for the simulated portion of this test:

Test bed configuration ADAS_ITC_2, depicted in appendix C, was used for test B3_WIS. The ADAS software configuration file used for this procedure was 08. This provides for a total of 137 weather inputs to the ADAS from the IPS: 68 were AWOS inputs, sending only AWOS format messages, and 69 ASOS inputs, providing both AWOS and SAO format messages.

The conduct of this test was focused on running a specially prepared IPS sequence group file. The test ran automatically as driven by the test script built into the sequence files called out by the main sequence group file.

The sequence group file used for this test was assembled to send a variety of messages to the ADAS every minute, including AWOS format messages containing specialist's remarks. The requirements being evaluated by this test all relate to ADAS accepting input data, but the ADAS output data was actually used to verify that the specific data reached the ADAS in the first place. Therefore, the IPS was used also to collect all outgoing data to the DLP. Each weather message received at ADAS, whether from an AWOS or ASOS, will contain an AWOS-format message that, after being received by ADAS, should be passed through to the DLP. Hence, the overall test method for test B3 was to simulate the 137 inputs to ADAS, and to verify that they were in turn sent to the DLP simulator in the IPS.

All of the AWOS type AWOS simulators were set up to respond with standard AWOS messages. Seventeen of these simulators responded with an AWOS message containing remarks. Fourteen simulators generated additive synoptic temperature by varying the temperature between 60° and 85°, and precipitation accumulation, by incrementing the accumulation amount. Five simulators responded with AWOS messages that were expected to cause the generation of SAO special messages when processed by ADAS. Another five simulators responded with messages that generate SAO urgent messages when processed by ADAS.

All of the ASOS type AWOS simulators were set up to respond with a standard AWOS message. Those same simulators additionally responded with SAO SA messages. Seventeen simulators responded with an AWOS message and an SAO SA message that carries remarks. Five simulators responded with SAO special messages, and five simulators responded with SAO urgent messages.

Specific step-by-step test procedures for this test are provided in the ADAS OT&E Test Procedure document.

4.4.2.5.4 Data Collection and Analysis Method.

The key data collected to show compliance with the weather input-related requirements included:

a. IPS DLP Test Statistics Log
b. IPS RWP Test Statistics Log
c. IPS DLP AWOS Incoming Message Log
d. IPS DLP WMSCR Incoming Message Log

The DLP and RWP message and statistics logs were expected to indicate that all 137 messages from each cycle were received by the ADAS and distributed.

Pursuant to verification of the NAS-SS-1000 requirements, the DR&A steps for test B3 addressed analysis of the test data collected by the IPS for verification of the reception and delivery of messages from all 137 AWOS simulators. The collected data also demonstrates that ADAS accepted data once per minute and updated its database so that data from 137 sites per minute could be accepted.

Where needed, data generated during the Category A testing was gathered and presented to add further credibility to the results from the simulated portion of the test.

4.4.3 Test Category C Data Processing.

The testing in Category C addressed the NAS-SS-1000 ADAS requirements relating to the processing of information collected from external subsystems. This section addresses the Category C high level test objectives and test requirements, followed by a more detailed discussion of each test performed in this category.

4.4.3.1 Category C Test Objectives (High Level).

The objective of the tests in this category was to verify that ADAS accepts and processes correct AWOS messages in support of special SAO generation and additive SAO generation, and rejects incorrect SAO messages.

4.4.3.2 Category C Test Requirements.

Table 4.4.3.2-1, which follows, furnishes specific paragraph numbers of the NAS-SS-1000 System Specification requirements for the ADAS addressed by the Category C verification procedure. The specific information related to these paragraph numbers appear in the ADAS OT&E Integration Test Plan TVRTM.

TABLE 4.4.3.2-1. CATEGORY C NAS-SS-1000 REQUIREMENTS

Paragraph No.	Volume	ADAS ITC	Relates to
3.2.1.1.4.1.c	I	1	Growth and Expandability
3.2.1.1.4.1.g	I	1	Hazardous classification
3.2.1.5.8.2.2.3.a.1	II	1	Ceiling Special Report (SP)
3.2.1.5.8.2.2.3.a.2	II	1	Ceiling SP
3.2.1.5.8.2.2.3.a.3	II	1	Ceiling SP
3.2.1.5.8.2.2.3.b.1	II	1	Cloud/Obscuring Phenomena SP
3.2.1.5.8.2.2.3.b.2	II	1	Cloud/Obscuring Phenomena SP
3.2.1.5.8.2.2.3.c.1	II	1	Visibility SP
3.2.1.5.8.2.2.3.c.2	II	1	Visibility SP
3.2.1.5.8.2.2.3.c.3	II	1	Visibility SP
3.2.1.5.8.2.2.3.c.4	II	1	Visibility SP
3.2.1.5.8.2.2.3.d	II	1	Wind SP
3.2.1.5.8.2.2.3.e	II	1	Thunderstorm SP
3.2.1.5.8.2.2.3.f.1	II	1	Hail SP
3.2.1.5.8.2.2.3.f.2	II	1	Freezing Rain SP
3.2.1.5.8.2.2.3.f.3	II	1	Ice Pellet SP
3.2.1.5.8.2.2.3.g	II	1	Operational Runway SP
3.2.1.5.8.2.2.3.h.1	II	1	Pressure SP
3.2.1.5.8.2.2.3.h.2	II	1	Pressure SP
3.2.1.5.8.2.2.3.h.3	II	1	Pressure SP
3.2.1.5.8.2.2.4	II	1	Urgent Special Report (USP)
3.2.1.5.8.2.2.6	II	1	SAO Conversion

4.4.3.3 Test C1: Weather Data Processing - General.

This test addressed the evaluation of the following ADAS weather data processing requirements: RVR, Invalid Data, Sky Condition, Wind, and Visibility Special Message Generation.

4.4.3.3.1 Test Objective.

The objective of this test was to verify the NAS-SS-1000 requirements for ADAS to accept and process both correct and incorrect AWOS messages in support of special SAO generation. This was achieved by programming five AWOS simulators in the IPS to do the following:

Simulator 1 - Generate Ceiling and Runway Visual Range (RVR) Specials

Simulator 2 - Alternate between five messages that indicate a thunderstorm with freezing rain is occurring, a message that has a 5-minute old date/time stamp, an erroneous message, and a message containing "out of bounds" parameter values.

Simulator 3 - Generate Sky Condition Specials

Simulator 4 - Generate Wind Specials

Simulator 5 - Generate Visibility Specials

4.4.3.3.2 Test Requirements.

Each of the five AWOS simulator test sequences in the IPS were designed to trigger ADAS generation of various SAO special messages. The following provides a list of the requirements addressed by each simulator.

AWOS simulator #1, which varied the ceiling and RVR parameters within its response message, addressed the following four requirements:

II: 3.2.1.5.8.2.2.3.a.1	Flag AWOS generated observations and issue a special report (SP) when the ceiling forms or dissipates below, decreases to less than, or if below, increases to or exceeds 3000 feet.
II: 3.2 1.5.8.2.2.3.a.2	Flag AWOS generated observations and issue a SP when the ceiling forms or dissipates below, decreases to less than, or if below, increases to or exceeds 1000 feet.
II: 3.2.1.5.8.2.2.3.a.3	Flag AWOS generated observations and issue a SP when the ceiling forms or dissipates below, decreases to less than, or if below, increases to or exceeds 500 feet.

II: 3.2.1.5.8.2.2.3.g	Flag AWOS generated observations and issue a SP when value reported for an operational runway during the preceding 10 minutes decreases to or below, or if below, increases to or exceeds, 2400 feet.

AWOS simulator #2, which alternated between four AWOS weather messages: (1) a standard message with indication of freezing rain/thunderstorm; (2) a standard message with the date/time stamp set back 5 minutes; (3) an erroneous AWOS message; and (4) a message with out-of-bounds parameters to check the ADAS system tolerance of invalid data, addressed the following three requirements:

II: 3.2.1.5.8.2.2.3.e	Flag AWOS generated observations and issue a SP if a thunderstorm begins, increases in intensity or ends.
II: 3.2.1.5.8.2.2.3.f.2	Flag AWOS generated observations and issue a SP when freezing precipitation begins, ends, or changes in intensity;
II: 3.2.1.5.8.2.2.6	Perform format conversion of AWOS messages to SAO format for hourly and special reports for dissemination to WMSCR. Perform reasonableness checks on incoming data (time, format, etc.).

AWOS simulator #3, which alternated the first cloud base to trigger sky condition specials, addressed the following two requirements:

II: 3.2.1.5.8.2.2.3.b.1	Flag AWOS generated observations and issue a SP when a layer of clouds or obscuring phenomena is detected at or below 1000 feet, and such condition was not reported in the preceding observation;
II: 3.2.1.5.8.2.2.3.b.2	Flag AWOS generated observations and issue a SP when a layer of cloud or obscuring phenomena aloft is at or below the highest instrument landing minutes applicable to the airport, and such condition was not reported below this height in previous observation.

AWOS simulator #4, which varied the wind speed to generate three wind speed specials, addressed requirement:

II:3.2.1.5.8.2.2.3.d	Flag AWOS generated observations and issue a SP when a change in the average wind direction of 45° or more in less than 15 minutes and where the wind speed exceeds 6 knots.

AWOS simulator #5, which was designed to produce 12 visibility specials by varying the visibility parameter values in sequential standard AWOS messages, addressed the following four requirements:

II: 3.2.1.5.8.2.2.3.c.1	Flag AWOS generated observations and issue a special when reported visibility decreases to less than, or if below, increases to or exceeds 3 miles.

II: 3.2.1.5.8.2.2.3.c.2	Flag AWOS generated observations and issue a SP when reported visibility decreases to less than, or if below, increases to or exceeds 2 miles;
II: 3.2.1.5.8.2.2.3.c.3	Flag AWOS generated observations and issue a SP when reported visibility decreases to less than, or if below, increases to or exceeds 1.5 miles;
II: 3.2.1.5.8.2.2.3.c.4	Flag AWOS generated observations and issue a SP when reported visibility decreases to less than, or if below, increases to or exceeds 1 mile;

Furthermore, all of the above simulator sequences addressed requirements: I: 3.2.1.1.4.1.g and II: 3.2.1.5.8.2.2.6, which are:

I: 3.2.1.1.4.1.g	Classify weather information as hazardous which may impact flight operations;
II: 3.2.1.5.8.2.2.6	Perform format conversion of AWOS messages to SAO format for hourly and special reports for dissemination to WMSCR. Perform reasonableness checks on incoming data (time, format, etc.).

All of the requirements listed above were fully verifiable by this test because utilization of the IPS to trigger SAO special messages is sufficient to demonstrate the ADAS weather processing capabilities.

4.4.3.3.3 Test Conduct Method.

Test bed configuration ADAS_ITC_1, depicted in appendix C was used for test C1. The ADAS software configuration file for this procedure is 02. (See the ADAS Test Procedure document for a complete description of each configuration.)

Prior to beginning the test, various adaptation parameters were checked and modified if needed to ensure that the proper thresholds were set for ADAS to produce the special messages needed for requirement verification. These adaptation parameters included CEILING MINIMA, SKY MINIMA, VISIBILITY MINIMA, and RVR.

This test was then conducted by running the IPS sequences built for this test. The following describes in more detail what each of the five simulators did:

AWOS simulator #1 varied the ceiling and RVR parameters within its response message. The ceiling value was varied between 2 (200 feet) and 35 (3500 feet) beginning at 2 and incrementing 7 (700 feet), each cycle using the pyramid field option algorithm in the IPS. This was expected to produce specials each time the ceiling value crosses a ceiling threshold value. The RVR value was also alternated between 20 (2000 feet) and 35 (3500 feet). Each alternation was expected to trigger the generation of the SAO special message. Note that, after problems were found with the ADAS ability to produce RVR-related special messages, a separate test was performed to further exercise this function, where the RVR value was alternated between 21 (2100 feet) and 27 (2700 feet).

AWOS simulator #2 alternated between four AWOS weather messages. The first indicated that freezing rain was occurring, and that there was a thunderstorm at the AWOS site. The second message was a standard AWOS response message that had its date/time stamp set back 5 minutes. The third message was an erroneous AWOS message. The fourth message contained out-of-bounds parameters to check the ADAS system tolerance of invalid data.

AWOS simulator #3 alternated the first cloud base to trigger the sky condition specials. During the first eight cycles, the line_dn field option algorithm began at 11 (1100 feet) and ended at 1 (100 feet), decrementing 2 (200 feet) each cycle. This was expected to produce two specials; one when the value crosses the 1000-foot threshold and the second when it crosses the 500-foot threshold. During the second set of eight cycles, the line_up field option algorithm began at 1 (100 feet) and ended at 11 (1100 feet), incrementing by 2 (200 feet) each cycle.

AWOS simulator #4 varied the wind speed to generate wind speed specials. Three messages will be sent with a wind speed of 20 knots followed by two messages indicating a wind speed of 105 knots. This was expected to produce the special.

AWOS simulator #5 varied the visibility value up and down in sequential AWOS messages to produce visibility specials. The visibility values varied from 25 to 325 (0.25 to 3.25 miles). The line_up, and pyramid algorithms in the IPS were employed to create this variation of the visibility values.

Detailed procedures used for the conduct of test C1_GPRC can be found in the ADAS OT&E test procedure document.

4.4.3.3.4 Data Collection and Analysis Method.

The ADAS test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and/or IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data.

Test data from the AWOS messages in the IPS's Outgoing Message Log, the WMSCR SAO messages in the IPS's Incoming Message Log and IPS's Test Statistics Log were analyzed to verify the inputs to, and the outputs from the ADAS. The inputs from the AWOS simulators were designed to trigger generation of specific SAO messages. The outputs to the WMSCR were analyzed to verify the SAO generation requirements.

The key data collected to show compliance with the requirements included:

a. From the ADAS:

1. The ADAS Event Log, which was expected to contain entries from the predated messages.

2. The ADAS Error Log, which was expected to contain the out-of-bounds messages.

B. From the IPS:

1. The WMSCR Simulator Log, which was expected to show the SAO messages received, including the RVR, Thunderstorm Begin, Sky, Wind Speed, and Visibility Specials.

Pursuant to verification of the applicable NAS-SS-1000 requirements, procedure C1 DR&A steps in section 7.3.2.1 focused on the following two main areas:

a. The ADAS Logs indicate that only those messages that were in bounds were accepted, and those that were out of bounds were rejected and logged in the ADAS Error Log.

b. The SAO messages in the WMSCR Simulator Log were traced back to the original AWOS messages to determine if the SAO messages were generated properly (i.e., as the parameters in the AWOS messages crossed the various thresholds for special message generation.)

4.4.3.4 Test C2: Weather Data Processing - Wind and Pressure.

This test addressed ADAS weather data processing requirements related to wind direction and pressure rise special message generation.

4.4.3.4.1 Test Objective.

This objective of this test was to verify the NAS-SS-1000 requirements for ADAS to accept and process AWOS messages in support of special SAO generation. This was achieved by programming three AWOS simulators in the IPS to do the following:

Simulator 1 -	Generate a Wind Special (Direction Change > 45° with wind speed > 6 knots)
Simulator 2 -	Not generate a Wind Special (Direction Change > 45° with wind speed < 6 knots)
Simulator 3 -	Generate a Pressure Special

4.4.3.4.2 Test Requirements.

Each of the three AWOS simulator test sequences in the IPS were designed to trigger ADAS generation of various SAO special messages. The following provides a list of the requirements addressed by each simulator:

AWOS simulator #1, which provided 6.5 knot wind data with a wind shift of 90° over a 15-minute period, and a 60° average, addressed requirement II: 3.2.1.5.8.2.2.3.d: Flag AWOS generated observations and issue a SP when a change in the average wind direction of 45° or more in less than 15 minutes, and where the wind speed exceeds 6 knots.

AWOS simulator #2, which provided wind data similar to simulator #1, with a 5.5 knot wind speed, also addressed requirement II: 3.2.1.5.8.2.2.3.d.

AWOS simulator #3, which provided altimeter data varying between 29.98 to 30.04 conventional inches of mercury (inHg), addressed the following three requirements:

II: 3.2.1.5.8.2.2.3.h.1	Flag AWOS generated observations and issue a SP when a rise in pressure at a rate exceeding 0.005 inHg per minute and the rise is at least 0.02 inHg;
II: 3.2.1.5.8.2.2.3.h.2	Flag AWOS generated observations and issue a SP when a rise in pressure at a rate exceeding 0.005 inHg per minute and the pressure for 20 minutes or more following the beginning of the jump remains at least 0.02 inHg higher than at the beginning;
II: 3.2.1.5.8.2.2.3.h.3	Flag AWOS generated observations and issue a SP when a rise in pressure at a rate exceeding 0.005 inHg per minute and the beginning of the jump is distinctly separated from the beginning of any preceding jump by at least 20 minutes.

All of the above simulator sequences addressed the following two requirements:

I: 3.2.1.1.4.1.g	Classify weather information as hazardous which may impact flight operations;
II: 3.2.1.5.8.2.2.6	Perform format conversion of AWOS messages to SAO format for hourly and special reports for dissemination to WMSCR. Perform reasonableness checks on incoming data (time, format, etc.).

All of the requirements listed above were fully verifiable by this test because utilization of the IPS to trigger SAO special messages is sufficient to demonstrate the ADAS weather processing capabilities.

4.4.3.4.3 Test Conduct Method.

Test bed configuration ADAS_ITC_1, depicted in appendix C, was used for test C2. The ADAS software configuration file for this procedure is 02. (See the ADAS OT&E Test Procedures document for a complete description of each configuration.)

After proper initialization of the ADAS and IPS, test C2_W+PR was then conducted by running the IPS sequences uniquely built for this test. The following describes in more detail what each of the three simulators did:

AWOS simulator #1 responded to the polls from ADAS with a standard weather message with the wind speed set at 6.5 knots and the wind direction changed from 10 to 100° thus producing a wind shift of 90° over a 15-minute period having a 60° average. Wind direction and speed was held steady for the remainder of the test. After 15 minutes run time, a wind shift weather product was expected to be generated.

AWOS simulator #2 was identical to AWOS simulator #1 with the only exception being that the wind speed was set to 5.5 knots instead of 6.5. Therefore, after 15 minutes run time, a wind shift weather product was NOT expected to be generated since the wind speed is below the 6-knot threshold.

AWOS simulator #3 responded with a standard weather message with the altimeter value varying using the following IPS algorithms:

Algorithm	Max.	Min.	Start	Step	Repeat
line_up	2998	2998	2998	1	1
line_up	3003	3000	3000	3	1
pyrmd	3004	3001	3004	1	5
pyrmd	3002	3000	3002	1	4
pyrmd	3001	2999	3001	1	6
line_up	3003	3003	3003	0	2

The generated data was expected to produce two pressure jump traces. Jump A starting at minute 2 (29.98 inHg) and ending 20 minutes later at 29.99 inHg. The 20-minute jump should not have been sufficiently large (.02 inHg) to produce a pressure jump special. A second jump (B) starting at minute 3 (30.00 inHg) and ending at 30.03 inHg. This jump was expected to high enough (> .02 inHg) to generate a SAO special following 2 minutes of altimeter steady or decreasing readings. The special was expected to be reported on the 25th minute.

Detailed procedures used for the conduct of test C2_W+PR can be found in the ADAS OT&E Test Procedure document.

4.4.3.4.4 Data Collection and Analysis Method.

The ADAS Test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and/or IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data.

Test data from the AWOS messages in the IPS's Outgoing Message Log, the WMSCR SAO messages in the IPS's Incoming Message Log and IPS's Test Statistics Log were analyzed to verify the inputs to, and the outputs from the ADAS. The inputs from the AWOS simulators were designed to trigger generation of specific SAO messages. The outputs to the WMSCR were analyzed to verify the SAO generation requirements.

The key data collected from the IPS to show compliance with the requirements included:

a. the AWOS Simulator Log, which show the AWOS format messages sent to ADAS,

b. the WMSCR Simulator Log, which show the SAO messages received from ADAS, including the Wind and Pressure Specials.

Pursuant to verification of the applicable NAS-SS-1000 requirements, procedure C2 Data Reduction and Analysis (DR&A) steps in section 7.3.2.2 of the ADAS OT&E Test Procedure document were followed. The SAO messages in the WMSCR Simulator Log were traced back to the original AWOS messages to determine if the SAO messages were generated properly (i.e., as the parameters in the AWOS messages crossed the various thresholds for special message generation).

4.4.3.5 Test C3: Weather Data Processing - Hail and Urgent Specials.

This test addressed ADAS weather data processing requirements related to hail and ice pellet special message generation and urgent special message generation.

4.4.3.5.1 Test Objective.

The objective of this test was to verify the NAS-SS-1000 requirements for ADAS to accept and process AWOS messages in support of special and urgent special SAO generation. This was achieved by programming two AWOS simulators in the IPS to do the following:

Simulator 1 - Generate a hail special and an ice pellet special

Simulator 2 - Generate a tornado urgent special, a funnel cloud urgent special, and a water spout urgent special.

4.4.3.5.2 Test Requirements.

Each of the AWOS simulator test sequences in the IPS were designed to trigger ADAS generation of various SAO special messages. The following provides a list of the requirements addressed by each simulator:

AWOS simulator #1, which sent messages indicating detection of hail and ice pellets, addresses the following two requirements:

II: 3.2.1.5.8.2.2.3.f.1 Flag AWOS generated observations and issue a SP when hail begins or ends.

II: 3.2.1.5.8.2.2.3.f.3 Flag AWOS generated observations and issue a SP when ice pellets begin, end, or change in intensity.

AWOS simulator #2 which sent messages indicating a tornado, water spout, funnel cloud, or some combination thereof, addressed requirement:

II: 3.2.1.5.8.2.2.4: Issue an urgent special report (USP) when a tornado, water spout, or funnel cloud has been identified by a qualified observer at the AWOS operator terminal, and identified in the AWOS message.

Both of the above simulator sequences addressed the following two requirements:

I: 3.2.1.1.4.1.g Classify weather information as hazardous which may impact flight operations;

II: 3.2.1.5.8.2.2.6	Perform format conversion of AWOS messages to SAO format for hourly and special reports for dissemination to WMSCR. Perform reasonableness checks on incoming data (time, format, etc.).

All of the requirements listed above were fully verifiable by this test because utilization of the IPS to trigger SAO special and urgent special messages is sufficient to demonstrate the ADAS weather processing capabilities.

4.4.3.5.3 Test Conduct Method.

Test bed configuration ADAS_ITC_1, depicted in appendix C, was used for test C3_H+US. The ADAS software configuration file for this procedure is 02. (See the ADAS OT&E Test Procedure document for a complete description of each configuration.)

After proper initialization of the ADAS and IPS, test C3_H+US was then conducted by running the IPS sequences uniquely built for this test. The following describes in more detail what each of the two simulators did:

AWOS simulator #1 alternated between five AWOS weather messages. The first indicated that hail was occurring. The second indicated that hail had stopped. The third indicated that ice pellets were occurring. The fourth indicated that ice pellets were changing in intensity. The fifth indicated that ice pellets had stopped. Each of these messages was expected to cause the generation of a special message.

AWOS simulator #2 alternated between four AWOS weather messages. Every other message was a standard weather message. Alternating between the standard message were messages indicating that a qualified observer has identified:

a. a tornado
b. a water spout
c. a funnel cloud.

Each of these three messages was expected to cause the generation of an Urgent Special report.

Detailed procedures used for the conduct of test C3_H+US can be found in the ADAS OT&E Test Procedure document.

4.4.3.5.4 Data Collection and Analysis Method.

The ADAS test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data.

Test data from the AWOS messages in the IPS's Outgoing Message Log, the WMSCR SAO messages in the IPS's Incoming Message Log and IPS's Test Statistics Log were analyzed to verify the inputs to and the outputs from the ADAS. The inputs from the AWOS simulators were designed to trigger generation of specific SAO messages. The outputs to the WMSCR were analyzed to verify the SAO generation requirements.

The key data collected from the IPS to show compliance with the requirements included:

the AWOS Simulator Log, which show the AWOS format messages sent to ADAS,

the WMSCR Simulator Log, which show the SAO messages received from ADAS, including the wind and pressure specials.

Pursuant to verification of the applicable NAS-SS-1000 requirements, procedure C3 DR&A steps in section 7.3.2.3 of the ADAS OT&E Test Procedure document were followed. The SAO messages in the WMSCR Simulator Log were traced back to the original AWOS messages to determine if the SAO messages were generated properly (i.e., as the parameters in the AWOS messages crossed the various thresholds for special message generation.)

4.4.3.6 Test C4: Growth and Expandability.

This test addressed the capability of ADAS to support future growth and expansion.

4.4.3.6.1 Test Objective.

The objective of test C4 was to verify NAS-SS-1000 requirements for ADAS to provide the capability and flexibility to support future system growth and expandability. This was pursued through inspection of the ADAS hardware.

4.4.3.6.2 Test Requirements.

I:	3.2.1.1.4.1.c	Provide the capability and flexibility to support future growth and expandability;

This requirement was fully verifiable by this test because a hardware inspection is sufficient to demonstrate the upgradability of ADAS.

4.4.3.6.3 Test Conduct Method.

An inspection of the ADAS hardware was performed to determine the amount of expandability afforded by the existing ADAS design. During the inspection, it was noted if and how the ADAS hardware could be expanded or upgraded. This included review of the rack, chassis, Single Board Computer (SBC), and Communication Controllers (ICC).

4.4.3.6.4 Data Collection and Analysis Method.

The data collection and analysis method for this test simply entailed the review of the ADAS system manual and other ADAS maintenance-related documentation, and review of the notes taken during the hardware inspection.

4.4.4 Test Category D: Data Dissemination.

This section addresses the Category D high level test objectives and test requirements.

4.4.4.1 Category D Test Objectives (High Level).

The objectives of the Category D procedures is to verify that ADAS disseminates all weather products to the proper NAS users as required.

4.4.4.2 Category D Test Requirements.

Table 4.4.4.2-1, which follows, furnishes specific paragraph numbers of the NAS-SS-1000 Systems Specification requirements for the ADAS address by the Category D verification procedures. The specific information related to these paragraph numbers appear in the ADAS OT&E Integration Test Plan TVRTM.

TABLE 4.4.4.2-1. CATEGORY D NAS-SS-1000 REQUIREMENTS

Paragraph No.	Volume	ADAS ITC	Relates to
3.2.1.1.1.1.h	I	1	Affected flight operations
3.2.1.2.4.b.2	I	1	Local area specialists
3.2.1.2.4.b.4	I	1	Non-local area specialists
3.2.1.2.4.c.1	I	1	Weather trend information
3.2.1.2.4.e.4	I	1	Weather trend processing
3.2.1.5.8.2.2.1.a	II	1	Minimum/maximum temperatures
3.2.1.5.8.2.2.1.b	II	1	Precipitation accumulation
3.2.1.5.8.2.2.1.c	II	1	Pressure tendencies
3.2.15.8.2.2.2	II	1	Pressure rising/falling/unsteady
3.2.1.5.8.2.2.5.a.1	II	1 & 5	12-hour maximum temperature
3.2.1.5.8.2.2.5.a.2	II	1 & 5	24-hour maximum temperature
3.2.1.5.8.2.2.5.b.1	II	1 & 5	12-hour minimum temperature
3.2.1.5.8.2.2.5.b.2	II	1 & 5	24-hour minimum temperature
3.2.1.5.8.2.2.5.c	II	1 & 5	3-hour pressure tendency
3.2.1.5.8.2.2.5.d.1	II	1 & 5	6-hour precipitation accumulation
3.2.1.5.8.2.2.5.d.2	II	1 & 5	24-hour precipitation accumulation
3.2.1.5.8.2.2.5.d.3	II	1 & 5	1-hour precipitation accumulation
3.2.1.5.8.2.2.5.e	II	1 & 5	1-hour pressure unsteady
3.2.1.5.8.2.2.5.f	II	1 & 5	1-hour pressure rise/fall
3.2.1.5.8.2.4.a	II	1, 5 & 6	Output to RWP
3.2.1.5.8.2.4.b	II	1, 5 & 6	Output to DLP
3.2.1.5.8.2.4.c	II	1, 5 & 6	Output to WMSCR
3.2.1.5.8.2.6.a	II	1	SP throughput limit
3.2.1.5.8.2.6.b	II	2	Data throughput limit

4.4.4.3 Test D1: Additive SAO - Pressure, Precipitation, and Wind.

This test addresses the requirements for ADAS special SAO generation.

4.4.4.3.1 Test Objectives.

Initially, the CTS simulator advanced the test time (CTS signal and thus the ADAS system time) to 23:59.

The first simulator responded with a standard weather message and vary the sea-level pressure. The resulting data should have produced a varied pressure, beginning the 3-hour tendency, starting at 1012 millibars (mb) (29.75 inHg) (during hour 1) and finishing at 1025 mb (30.15 inHg) (during hour 3), an increase of 13 mb (.4 inHg). This should produce the greater than 9.8 mb 3-hour pressure tendency weather product. A second 3-hour pressure tendency (during hours 4-6) should be produced by a declining pressure starting at 1025 mb (30.15 inHg) (during hour 4) and ending (during hour 6) at 1018 mb (29.95 inHg), a decrease of 7 mb (.2 inHg). This should produce the less than 9.8 mb 3-hour pressure tendency weather product.

The second simulator responded with a standard weather message with octet 28 = 48 (moderate rain) and continually increment the precipitation accumulation by 3 (.03 inches), passing six hour-marks, to produce the 6-hour cumulative precipitation message. Each hour, the second simulator should additionally cause the generation of a present weather, 1-hour precipitation message.

The third simulator alternately sent messages indicating precipitation begin and end for all nine precipitation types. This should cause the generation of present weather begin/end weather products which continue until the end of the test.

The fourth simulator responded with a message containing automated remarks indicating automated visibility and variable wind to generate the corresponding SAO weather products.

The fifth simulator responded with a message containing operator remarks. Twice during the test, the simulator disabled communications during the hourly poll thus missing the scheduled hourly (SA) observation. The simulator then enabled communications and responded to a subsequent poll thereby generating a resumption of service.

The sixth simulator varied the altimeter. The generated data produced the following barometric pattern; slow rise, rapid rise, slow fall, then a rapid fall, all over the first 14 cycles of the test (5 hour-marks). Six weather products should have been generated, four Pressure Unsteady, one Pressure Rising Rapidly and one Pressure Falling Rapidly.

4.4.4.3.2 Test Requirements.

Verify that the ADAS derives pressure tendencies (II: 3.2.1.5.8.2.2.1.c).

Verify that the ADAS generates hourly reports at an adaptive time and appends the hourly message with a pressure tendency report every 3 hours beginning at 0000 UTC, for the past 3 hours (II: 3.2.1.5.8.2.2.5.c).

Verify that the ADAS derives precipitation accumulation over adaptive periods (II: 3.2.1.5.8.2.2.1.b).

Verify that the ADAS disseminates aeronautical/weather data, to users, that directly affects flight operations (I: 3.2.1.1.1.1.h).

Verify that the ADAS derives additive data remarks for pressure rising/falling rapidly and pressure unsteady (II: 3.2.1.5.2.2.2).

Verify that the ADAS (NAS) performs all processing required to produce and/or complete a description of the current, trend, or predicted conditions by filtering, decoding, editing and reformatting acquired weather data to facilitate its operational use by NAS specialists and users (I: 3.2.1.2.4.e.4).

Verify that the ADAS disseminates current products and hourly products within 10 seconds of receipt of the data (II: 3.2.1.5.8.2.6.b).

4.4.4.3.3 Test Conduct Method.

Test bed configuration ADAS_ITC_5, depicted in appendix C, was used for test D1_ASAO. The ADAS software configuration file used for this test was 12. The IPS was used to provide simulation of all interfacing subsystems.

4.4.4.3.4 Data Collection and Analysis Method.

The ADAS test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data.

Test data from the AWOS messages in the IPS's Outgoing Message Log, the WMSCR SAO messages in the IPS's Incoming Message Log and IPS's Test Statistics Log were analyzed to verify the inputs to and the outputs from the ADAS. The inputs from the AWOS simulators were designed to trigger generation of specific SAO messages. The outputs to the WMSCR were analyzed to verify the SAO generation requirements. The time stamps of the Outgoing Message Log (OML) and Incoming Message Log (IML) were compared to verify message throughput requirements.

4.4.4.4 Test D2: RWP, DLP, and WMSCR Data Dissemination.

This test addresses the requirements for wind and pressure jump SAO message generation and the dissemination of ADAS weather products to external subsystems.

4.4.4.4.1 Test Objectives.

The first simulator responded with a standard weather message with the wind speed set at 20 knots and the wind direction varied. The generated data produced a wind shift of 90° over a 15-minute period having a 60° average. Wind direction and speed were held steady for the remainder of the test. After 15 minutes run time, a wind shift weather product should have begun to be generated in each SAO message sent to the WMSCR.

The second responded with a standard weather message with the wind speed set at 4 knots and the wind direction varied. The generated data produced a wind shift of 90° over a 15-minute period having a 60° average. Wind direction and speed will be held steady for the remainder of the test. A wind shift weather product should NOT be generated in each SAO message sent to the WMSCR simulator as the wind speed is below the 6-knot threshold.

The third responded with a standard weather message with the altimeter value altered. The generated data should produce two pressure jump traces. Jump A should start at minute 2 (29.98 inHg) and ends 20 minutes later at 29.99 inHg. The 20-minute jump is not sufficiently large (.02 inHg) to produce a pressure jump special. The previous 20 minutes of altimeter data should then be searched for other possible pressure jumps. A second jump B should start at minute 3 (30.00 inHg) and ends at 30.03 inHg. This jump is sufficiently high (> .02 inHg) to generate an SAO special following 2 minutes of altimeter steady or decreasing readings. A special SAO message should be generated on the 25th minute.

4.4.4.4.2 Test Requirements.

Verify that the ADAS disseminates aeronautical/weather data, to users, that directly affects flight operations (I: 3.2.1.1.1.1.h).

Verify that the ADAS disseminates surface observations to the RWP subsystem, minute-by-minute, hourly, and specials in AWOS format (I: 3.2.1.2.4.b.2 and II: 3.2.1.5.8.2.4.a).

Verify that the ADAS disseminates surface observations to the WCP (DLP) subsystem, minute-by-minute, hourly, and specials in AWOS format (I: 3.2.1.2.4.b.2 and II: 3.2.1.5.8.2.4.b).

Verify that the ADAS disseminates surface observations to the WMSCR subsystem, minute-by-minute, hourly, and specials in SAO format (II: 3.2.1.5.8.2.4.c).

Verify that the ADAS makes current surface weather observation information available to non-local area specialists and users, and is updated at least once per hour (I: 3.2.1.2.4.b.4).

4.4.4.4.3 Test Conduct Method.

Test bed configuration ADAS_ITC_5, depicted in appendix C, was used for test D2_DRWD. The ADAS software configuration file used for this test was 02. The IPS was used to provide simulation of all interfacing subsystems.

4.4.4.4.4 Data Collection and Analysis Method.

The ADAS test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data.

Test data from the AWOS messages in the IPS's Outgoing Message Log, the WMSCR SAO messages in the IPS's Incoming Message Log and IPS's Test Statistics Log were analyzed to verify the inputs to, and the outputs from the ADAS. The inputs from the AWOS simulators were designed to trigger generation of specific SAO messages. The outputs to the WMSCR were analyzed to verify the SAO generation requirements.

4.4.4.5 Test D3: Additive SAO - Precipitation Accumulation.

This test addresses additive SAO message generation relating to accumulation of precipitation.

4.4.4.5.1 Test Objectives.

Initially, the CTS simulator advanced the test time (CTS signal and thus the ADAS system time) to 23:59.

An AWOS simulator responded with a standard weather message with octet 28 = 48 (moderate rain) and continually incremented the precipitation accumulation by 3 (.03 inches), passing 25 hour-marks, to produce the 24-hour (hour 00:00) precipitation accumulation weather product.

4.4.4.5.2 Test Requirements.

Verify that the ADAS (NAS) performs all processing required to produce and/or complete a description of the current, trend, or predicted conditions by filtering, decoding, editing, and reformatting acquired weather data to facilitate its operational use by NAS specialists and users (I: 3.2.1.2.4.e.4).

Verify that the ADAS disseminates surface observations to the WMSCR sub-system, minute-by-minute, hourly, and specials in SAO format (II: 3.2.1.5.8.2.4.c).

Verify that the ADAS generates hourly reports at an adaptive time, and appends the hourly message with a 6-hour precipitation accumulation report every 6 hours beginning at 0000 UTC (II: 3.2.1.5.8.2.2.5.d.1).

Verify that the ADAS generates hourly reports at an adaptive time, and appends the hourly message with a 24-hour precipitation accumulation, reported at 1200 UTC (II: 3.2.1.5.8.2.2.5.d.2).

Verify that the ADAS generates hourly reports at an adaptive time, and appends the hourly message with a 1-hour precipitation accumulation, reported hourly (II: 3.2.1.5.8.2.2.5.d.3).

Verify that the ADAS derives precipitation accumulation over adaptive periods (II: 3.2.1.5.8.2.2.1.b).

4.4.4.5.3 Test Conduct Method.

Test bed configuration ADAS_ITC_5, depicted in appendix C, was used for test D3_Pcip. The ADAS software configuration file used for this test was 02. The IPS was used to provide simulation of all interfacing subsystems.

4.4.4.5.4 Data Collection and Analysis Method.

The ADAS test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data.

Test data from the AWOS messages in the IPS's Outgoing Message Log, The WMSCR SAO messages in the IPS's Incoming Message Log and IPS's Test Statistics Log were analyzed to verify the inputs to and the outputs from the ADAS. The inputs from the AWOS simulators were designed to trigger generation of specific SAO messages. The outputs to the WMSCR were analyzed to verify the SAO generation requirements.

4.4.4.6 Test D4: Additive SAO - Temperature and Pressure.

This test addresses the requirements for the generation of temperature and pressure special SAO message generation.

4.4.4.6.1 Test Objectives.

Initially, the CTS simulator will advance the test time (CTS signal and thus the ADAS system time) to 05:59.

AWOS simulator #1 will respond with a standard weather message while continually varying the initial temperature field. This will produce a varying temperature between 130° (230) and 35° (135). This pattern will be repeated 12 times during the test. After passing 30 hour-marks, to produce all of the 12- and 24-hour maximum/minimum temperature weather products, the simulator will run an additional 3 minutes through the 31st hour-mark.

AWOS simulator #2 will respond with a standard weather message but will continually vary the initial temperature field. This will produce a varying temperature between +35° (135) and -60° (40). This pattern will be repeated 12 times during the test. After passing 30 hour-marks, to produce all of the 12- and 24-hour maximum/minimum temperature weather products, the simulator will run an additional 3 minutes through the 31st hour-mark.

AWOS simulator #3 will respond with a standard weather message but continually vary the initial altimeter field (2950 [100th inHg]) randomly between 3015 and 2975 using a random number seed of 2950. After passing 4 hour-marks, to produce the 3-hour pressure unsteady weather product, the simulator will begin responding with standard AWOS messages until the end of the test.

4.4.4.6.2 Test Requirements.

Verify that the ADAS generates hourly reports at an adaptive time, and appends the hourly message with a report for the maximum temperature for the last 12 hours at 0000 UTC (II: 3.2.1.5.8.2.2.5.a.1).

Verify that the ADAS generates hourly reports at an adaptive time, and appends the hourly message with a report for the maximum temperature for the last 24 hours at 0600 UTC (II: 3.2.1.5.8.2.2.5.a.2).

Verify that the ADAS generates hourly reports at an adaptive time, and appends the hourly message with a report for the minimum temperature for the last 12 hours at 1200 UTC (II: 3.2.1.5.8.2.2.5.b.1).

Verify that the ADAS generates hourly reports at an adaptive time, and appends the hourly message with a report for the minimum temperature for the last 24 hours at 1800 UTC (II: 3.2.1.5.8.2.2.5.b.2).

Verify that the ADAS generates hourly reports at an adaptive time, and appends the hourly message with an hourly pressure unsteady report if the pressure varies by 0.03 inches from the mean trend (II: 3.2.1.5.8.2.2.5.e).

Verify that the ADAS generates hourly reports at an adaptive time, and appends the hourly message with an hourly pressure rise/fall rapidly report when the pressure rises/falls at a rate of 0.06 inches/hour or more with a total rise/fall of 0.02 inches (II: 3.2.1.5.8.2.2.5.f).

Verify that the ADAS maintains weather trend information for the past 3 hours (I: 3.2.1.2.4.c.1).

Verify that the ADAS (NAS) performs all processing required to produce and/or complete a description of the current, trend, or predicted conditions by filtering, decoding, editing, and reformatting acquired weather data to facilitate its operational use by NAS specialists and users (I: 3.2.1.2.4.e.4).

Verify that the ADAS derives minimum/maximum temperatures over an adaptive period and provides this as additive data (II: 3.2.1.5.8.2.2.1.a).

4.4.4.6.3 Test Conduct Method.

Test bed configuration ADAS_ITC_5, depicted in appendix C, was used for test D4_Temp. The ADAS software configuration file used for this test was 02. The IPS was used to provide simulation of all interfacing subsystems.

4.4.4.6.4 Data Collection and Analysis Method.

The ADAS test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data.

Test data from the AWOS messages in the IPS's Outgoing Message Log, the WMSCR SAO messages in the IPS's Incoming Message Log and IPS's Test Statistics Log were analyzed to verify the inputs to and the outputs from the ADAS. The inputs from the AWOS simulators were designed to trigger generation of specific SAO messages. The outputs to the WMSCR were analyzed to verify the SAO generation requirements.

4.4.4.7 Test D5: Five-Second SAO Throughput Processing.

This procedure verifies NAS-SS-1000 requirements for ADAS special SAO message throughput.

4.4.4.7.1 Test Objectives.

The IPS simulated six ASOS type AWOS stations and six AWOS (FAA type) stations. After two mission cycles, a processing power dummy load utility gradually increased the system processing load until the 5-second SAO special alarm was generated. At the end of the test, the MPS simulator logged on to the ADAS system, waited for confirmation, and retrieved the event log data covering the duration of the test. The MPS simulator then logged off.

4.4.4.7.2 Test Requirements.

a. Verify that the ADAS maintains weather trend information for the past three hours (I: 3.2.1.2.4.c.1).

b. Verify that the ADAS disseminates specials within 5 seconds of receipt of the data (II: 3.2.1.5.8.2.6.a).

4.4.4.7.3 Test Conduct Method.

Test bed configuration ADAS_ITC_1, depicted in appendix C, was used for test D5_5sec. The ADAS software configuration file used for this test was 08. The IPS was used to provide simulation of all interfacing subsystems.

4.4.4.7.4 Data Collection and Analysis Method.

The ADAS test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data.

4.4.4.8 Test D6: Ten-Second SAO Throughput Processing.

This procedure verifies NAS-SS-1000 requirements for ADAS current and hourly SAO message throughput.

4.4.4.8.1 Test Objectives.

The IPS test enabled all configured simulators and responded to normal poll/request events. The test operator disabled the 10-second AWOS throughput alarm before starting the sequence. After two mission cycles, the processing power dummy load utility gradually increased the system processing load until the 10-second SAO alarm is generated. At the end of the test, the MPS simulator logged on to the ADAS system, waited for confirmation, and retrieved the event log data covering the duration of the test. The MPS simulator then logged off.

4.4.4.8.2 Test Requirements.

a. Verify that the ADAS (NAS) performs all processing required to produce and/or complete a description of the current, trend, or predicted conditions by filtering, decoding, editing, and reformatting acquired weather data to facilitate its operational use by NAS specialists and users (I: 3.2.1.2.4.e.4).

b. Verify that the ADAS disseminates current products and hourly products within 10 seconds of receipt of the data (II: 3.2.1.5.8.2.6.b).

4.4.4.8.3 Test Conduct Method.

Test bed configuration ADAS_ITC_2, depicted in appendix C, was used for test D6_10ST. The ADAS software configuration file used for this test was 08. The IPS was used to provide simulation of all interfacing subsystems.

4.4.4.8.4 Data Collection and Analysis Method.

The ADAS test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data.

4.4.4.9 Test D7: Throughput 10-Second AWOS Alarm.

This procedure verifies NAS-SS-1000 requirements for ADAS AWOS message throughput.

4.4.4.9.1 Test Objectives.

The IPS test enabled all configured simulators and responded to normal poll/request events. All configured AWOS and ASOS type AWOS stations responded with one AWOS message per polling. After two mission cycles, the processing power dummy load utility gradually increased the system processing load until the 10-second AWOS alarm is generated. At the end of the test, the MPS simulator logged on to the ADAS system, waited for confirmation, and retrieved the event log data covering the duration of the test. The MPS simulator then logged off.

4.4.4.9.2 Test Requirements.

a. Verify that the ADAS (NAS) performs all processing required to produce and/or complete a description of the current, trend, or predicted conditions by filtering, decoding, editing, and reformatting acquired weather data to facilitate its operational use by NAS specialists and users (I: 3.2.1.2.4.e.4).

b. Verify that the ADAS disseminates current products and hourly products within 10 seconds of receipt of the data (II: 3.2.1.5.8.2.6.b).

4.4.4.9.3 Test Conduct Method.

Test bed configuration ADAS_ITC_1, depicted in appendix C, was used for test D7_10AA. The ADAS software configuration file used for this test was 08. The IPS was used to provide simulation of all interfacing subsystems.

4.4.4.9.4 Data Collection and Analysis Method.

The ADAS test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data.

4.4.5 Test Category E: SAO Message Archival.

The testing in Category E addressed the NAS-SS-1000 ADAS requirements relating to the archiving of weather data.

This section addresses the Category E high-level test objectives and test requirements, followed by a more detailed discussion of each test performed in this category.

4.4.5.1 Category E Test Objectives (High Level).

The objective of the tests in this category was to verify that ADAS-generated SAO messages are archived by ADAS for a period of 15 days.

4.4.5.2 Category E Test Requirements.

Table 4.4.5.2-1, which follows, furnishes specific paragraph numbers of the NAS-SS-1000 Systems Specification requirements for the ADAS address by the Category E verification procedure. The specific information related to these paragraph numbers appear in the ADAS OT&E Integration Test Plan TVRTM.

TABLE 4.4.5.2-1. CATEGORY E NAS-SS-1000 REQUIREMENTS

Paragraph No.	Volume	ADAS ITC	Relates to
3.2.1.1.4.1.n	I	1	Reconstruction and investigation
3.2.1.2.4.g	I	1	Data archiving
3.2.1.5.8.1.5	II	1	Data archiving
3.2.1.5.8.2.5	II	1	Archive time period

4.4.5.3 Test E1: SAO Archive.

This test addressed the ADAS requirements relating to the archiving of weather data.

4.4.5.3.1 Test Objective.

The objective of this test was to verify the NAS-SS-1000 requirements for ADAS to archive ADAS-generated weather data for a period of 15 days.

This was achieved by programming five AWOS simulators in the IPS to essentially perform the same function: respond to the polls from ADAS with alternating rain-start and rain-end messages. These were chosen to trigger ADAS generation of SAO special messages, such that they would be logged in the SAO Archive Log.

4.4.5.3.2 Test Requirements.

The following provides a list of the requirements addressed by this test:

I: 3.2.1.1.4.1.n — Archive weather information for use in event reconstruction and accident investigation;

I: 3.2.1.2.4.g — The NAS shall archive all weather information in accordance with section 3.2.1.2.8.3;

II: 3.2.1.5.8.1.5 — The ADAS shall archive data;

II: 3.2.1.5.8.2.5 — Archive all ADAS generated messages for a period of 15 days.

All of these requirements can be fully verified by this test because utilization of the IPS to advance the simulated CTS time and send simulated messages is sufficient to demonstrate the ADAS weather archiving capabilities.

4.4.5.3.3 Test Conduct Method.

Test bed configuration ADAS_ITC_1, depicted in appendix C, was used for test E1. The ADAS software configuration file for this procedure is 02. (See the ADAS OT&E Test Procedure document for a complete description of each configuration.)

After proper initialization of the ADAS and IPS, test E1_ARTA was then conducted by running the IPS sequences uniquely built for this test. The following describes in detail what the five simulators did:

The AWOS simulators each responded with alternating rain-start and rain-end messages. This was expected to produce a corresponding additive string of rain start/stop components in the SAO messages. The CTS simulator shifted the time signal during the test to cross an hour mark once a day for 17 days, running for 2 minutes before and after each hour mark (the test started with a system time of 0058 hours). This type of scenario would then cause three special messages per day to be generated by ADAS in response to the inputs from each simulator. At the end of the test, the MPS simulator logged on to the ADAS system and retrieved the SAO archive data covering the duration of the test (360 hours worth). The test operator was prompted to view the archive using the specialist interface and acknowledge the prompt. The MPS simulator then logged off.

Detailed procedures used for the conduct of test E1_ARTA can be found in the ADAS OT&E Test Procedure document. Specific test steps are provided in the E1_ARTA Test Conduct Form in the ADAS OT&E Test Procedures document.

In addition to this method of evaluating the ADAS archive performance in this manner, the overall experience of the ADAS test team was also used to add further depth to the verification of the archiving requirements.

4.4.5.3.4 Data Collection and Analysis Method.

The ADAS test bed configuration used in this test provided for the automatic recording of all data transferred to or from the ADAS via the IPS. This data was automatically recorded and stored on the ADAS and IPS hard disks. The IPS data reduction capability allowed for specific data to be extracted from the stored test data and used for archive requirement verification.

Test data from the AWOS messages in the IPS's Outgoing Message Log, the WMSCR SAO messages in the IPS's Incoming Message Log and IPS's Test Statistics Log were analyzed to review the inputs to and the outputs from the ADAS. The inputs from the AWOS simulators were designed to trigger generation of precipitation-related SAO messages. The contents of the SAO Archive Log were analyzed to verify the archiving requirements.

The key data collected from the IPS to show compliance with the requirements included:

a. the AWOS Simulator Log, which shows the AWOS format messages sent to ADAS,

b. the SAO Archive Log retrieved from ADAS by the MPS simulator in the IPS,

c. the WMSCR Simulator Log, which shows the SAO messages received from ADAS. Pursuant to verification of the applicable NAS-SS-1000 requirements, procedure E1 DR&A steps in section 7.3.2.6 of the Test Procedure document were followed. The SAO messages in the WMSCR simulator log were traced back to the original AWOS messages to determine if the SAO messages were generated, and that they were recorded in the SAO Archive Log.

4.4.6 Test Category F: Maintenance Functions.

This section addresses the Category F high-level test objectives and test requirements.

The complete report for Category F is contained in the Remote Monitoring Subsystem (RMS) Functional Test of the Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) Test Report document produced by ACN-100D. Only the high-level test objectives for Category F are contained in this report.

4.4.6.1 Category F Test Objectives (High Level).

The objective of the maintenance category is to verify that all ADAS Remote Monitoring Subsystem (RMS) to MPS interface requirements are fulfilled. This interface enables remote monitoring of the ADAS system performance. The MPS shall periodically initiate a request for performance data and maintenance log information from ADAS. Upon occurrence of a system alarm or state change, ADAS shall format and transfer an unsolicited report to the MPS.

4.4.6.2 Category F Test Requirements.

Table 4.4.6.2-1, which follows, furnishes specific paragraph numbers of the NAS-SS-1000 Systems Specification requirements for the ADAS addressed by the Category F procedures. The specific information related to these paragraph numbers appear in the ADAS OT&E Integration Test Plan TVRTM.

TABLE 4.4.6.2-1. CATEGORY F NAS-SS-1000 REQUIREMENTS

Paragraph No.	Volume	ADAS ITC	Relates to
3.2.1.1.9.1.a	I	5	Performance monitoring
3.2.1.1.9.1.b	I	5	Subsystem status and alarms
3.2.1.1.9.1.c	I	3	Control subsystem
3.2.1.1.9.1.d	I	1	I.D. LRU causing failure
3.2.1.1.9.1.g	I	5	Access capabilities
3.2.1.2.9.a	I	3	RMM performance characteristics
30.1.1.1.H	I	3	Performance parameter monitoring
30.1.1.2.H	I	3	Subsystem operating status
30.1.1.3.H	I	3	Subsystem status reports
30.1.1.4.H	I	3	Filing status and performance data
30.1.1.5.H	I	3	RMMS requests
30.1.1.6.H	I	3	Parameter out of tolerance alarm
30.1.1.9.H	I	3	Return-To-Normal alarm
30.1.1.10.H	I	3	Parameter out of range alert
30.1.1.11.H	I	3	Parameter modification
30.1.1.12.H	I	3	Disabling alarm or alert
30.1.1.13.H	I	3	Disabled alarm or alert report
3.2.1.5.8.1.3	II	1	Maintaining adaptive database
3.2.1.5.8.1.6.1	II	3	Maintenance Processing
3.2.1.5.8.1.6.2	II	3	Maintenance Processing
3.2.1.5.8.1.6.3	II	1	Maintenance Processing
3.2.1.1.2.2.4	V	3	Change of State Detection
3.2.1.1.4.1.1	V	3	Subsystem status/performance

TABLE 4.4.6.2-1. CATEGORY F NAS-SS-1000 REQUIREMENTS (continued)

Paragraph No.	Volume	ADAS ITC	Relates to
3.2.1.1.4.1.2	V	3	Real-time monitoring
3.2.1.1.4.1.3	V	3	Local data file
3.2.1.1.4.1.4	V	3	Data report
3.2.1.1.4.1.5	V	3	Operating status
3.2.1.1.4.1.6	V	3	Subsystem status response
3.2.1.1.4.1.7	V	3	Subsystem alarm generation
3.2.1.1.4.1.9	V	3	Return-to-normal alarm
3.2.1.1.4.1.10	V	3	Subsystem alert generation
3.2.1.1.4.1.11	V	3	Alarm/alert parameters
3.2.1.1.4.1.12	V	3	Alarm/alert disabling
3.2.1.1.4.1.13	V	3	Alarm/alert disable report
3.2.1.1.4.1.14	V	3	Certification test data
3.2.1.1.4.1.15	V	3	Diagnostic test data
3.2.1.1.4.1.18	V	3	Operating mode change
3.2.1.1.4.1.19	V	3	Parameter adjustment
3.2.1.1.4.1.20	V	3	Reset
3.2.1.1.4.1.21	V	3	Fault-isolation
3.2.1.1.4.2.1	V	3	Alarm/alert detection; 2-10 seconds
3.2.1.1.4.2.2	V	3	Change of state; 2-10 seconds
3.2.1.1.4.2.3	V	3	Cert/diagnostic; 50-240 seconds
3.2.1.1.4.2.4	V	3	Execute control cmds; 2-5 seconds
3.2.1.1.4.2.7	V	3	Operating mode status
3.2.1.1.4.2.8	V	3	Message priority
3.2.1.1.4.3	V	3	Functional/Physical Interfaces

4.4.6.3 Test Conduct Method.

Refer to the Remote Monitoring Subsystem (RMS) Functional Test of the Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) Test Report document produced by ACN-100D for details of the Category F Test Conduct Method. Only the high-level test objectives for Category F are contained in this report.

4.4.6.4 Data Collection and Analysis Method.

Refer to the Remote Monitoring Subsystem (RMS) Functional Test of the Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) Test Report document produced by ACN-100D for details of the Category F Data Collection and Analysis Method. Only the high-level test objectives for Category F are contained in this report.

5. RESULTS AND DISCUSSION.

5.1 TEST CATEGORY A: FUNCTIONAL AND PHYSICAL SETUP.

5.1.1 Functional Setup.

A. The functional setup requirements of the ADAS were verified during Developmental Test and Evaluation testing and the scheduled design review meetings between the FAA and the prime contractor.

5.1.2 ADAS/CTS Interface Testing.

A. Location of the CTS Used for Interface Testing:

1. The CTS used for interface testing was that of the DLP CTS located at the FAA Technical Center. This CTS, which complied completely with the CTS/ADAS ICD, was configured via an A/B switch to be connected to either the DLP or the ADAS.

B. Final (Current) Interface Status:

1. The CTS/ADAS interface is fully operational.

C. System Design Problems Encountered:

1. There were no system design problems encountered.

5.1.3 ADAS/AWOS Interface Testing.

A. Location of AWOS Stations Used for Interface Testing:

1. Otis Air Force Base (AFB), Cape Cod, MA.

2. Hampton Roads (Military Highway, Flight Line Building), VA (Note 1).

3. Chesterfield Co. (Airfield Drive, (Terminal Building), VA (Note 1).

Note 1: One of two drops on circuit with bridge in Richmond, VA.

B. Final (Current) Interface Status:

1. Otis AFB, MA - Fully Operational.

2. Hampton Roads, VA - Fully Operational.

3. Chesterfield Co., VA - Fully Operational.

4. Montgomery Co. (Airpark Drive, Administration Building), MD (Note 2) - Nonoperational (Note 3).

5. Genessee Co. (East Saile Drive, Terminal Building), NY (Note 2) - Nonoperational (Note 3).

6. Toms River (Robert J. Miller Airport), NJ - Nonoperational (Note 3).

Note 2: One of two drops on circuit with bridge in Batavia, NY.

Note 3: As of July 31, 1993, retrofitted with new EPROMS and new HDLC board and awaiting testing.

C. System Design Problems Encountered

There were three ADAS system design problems (SD1, SD2, and SD3) which affected the testing of all ADAS duplex interfaces:

SD1. Attaching a Line Monitor Protocol Analyzer (LMPA) in parallel to any of the ADAS Communications Transition Module (CTM) interfaces distorted the signals/information on that interface. Sometimes the distorted signals/information were obvious as such; however, on many other occasions, the distortions appeared to be failures in the protocol implementation of ADAS and/or the station/user with which it was communicating.

SD2. For each interface, except the CTS which is stipulated as EIA-232, the ADAS CTM port pin configuration does not comply with the EIA-530 standard stipulated in the corresponding ICD for that interface. The CTM implements a Motorola variation of the standard.

SD3. ADAS would periodically automatically shutdown and, most of the time, automatically restart within 30 seconds after shutdown. Occasionally, it would be necessary to manually restart the ADAS. During a large part of the period between shutdown and full startup, communications on all the ADAS interfaces would be disrupted. These shutdowns/startups would occur at irregular intervals ranging from a few minutes to an hour (with the predominant frequency being 1 hour) and appeared related to the frequent corrupted information on the ASOS and AWOS links and the transmission of error messages by ADAS to the offending station(s).

For a period of months, the Otis AFB AWOS was the only station used for diagnosis/repair of problems and for operational evaluation. After (1) all (evident) Otis problems were identified, diagnosed, and corrected, and (2) Otis subsequently tested over a period of weeks, all Otis modifications were incorporated in five new sets of EPROMS made for installation in the originally designated five AWOS test stations identified in section 5.1.3, B.2 through B.6.

The problems identified (by testing the Otis AFB Station) and remedied were:

1. The (Otis) AWOS station would not respond to an ADAS Receive Ready (RR) Command.

2. The AWOS station was not conforming to the link protocol specified in the AWOS/ADAS ICD with respect to the use of the P and F bits in the weather polling sequence.

3. When ADAS received an aborted weather (I) frame or an I frame with an Frame Check Sequence (FCS) error, the AWOS station did not retransmit this I frame even though ADAS maintained the same Transmitter Receive Sequence Number (N(R)) count in its continued transmission to the AWOS station of RR frames.

4. When a sequence count discrepancy occurred in which the N(R) of the ADAS polling I/RR frame differed from the Transmitter Send Sequence Number (N(S)) of the AWOS station I frame, the AWOS station did not adjust its N(S) to match the ADAS N(R).

5. The AWOS station had incorrectly appended two additional characters to its weather message.

6. Every message from the AWOS station was resulting in an ADAS Error Log entry. This was due to the fact that the ADAS software (SW) did not recognize a hex FE octet, designating that the RVR sensor is not connected to the AWOS station, in octet positions 43-45 of the (AWOS station) weather message.

7. The AWOS station was not handling/responding to an error message transmitted by ADAS.

D. Methods/Changes Used to Resolve Problems

The following steps were performed in resolution of each of the problems listed in section 5.1.3, C.1 through C.7.

1. Observing the testing on a Line Monitor/Protocol Analyzer (LMPA) and frequently printing the test data.

2. Evaluating the test data for compliance with the AWOS/ADAS ICD and the standards referenced therein.

3. Reviewing the testing/problems with personnel from Qualimetrics, the ADAS and AWOS projects, and from Volpe National Transportation Safety Center (VNTSC).

4. After a modification was made to either AWOS or ADAS, retesting of the AWOS/ADAS interface to determine if the problem was corrected and to insure that no other problem was inadvertently introduced (regression testing).

The additional following steps were performed in resolution of problems in section 5.1.3, C.1, C.3, C.4, and C.5.

4a. Determining with Qualimetrics the modification to be made.

5a. The burning of Electrically Programmable Read Only Memory (EPROMS) by Qualimetrics to reflect the decided upon modification.

6a. The installing by VNTSC of the new EPROMS in the Otis AFB AWOS.

For problem in section 5.1.3, C.2, the following additional steps were performed:

4b. Reviewing the testing/problem/ADAS protocol implementation with personnel from Communication & Power Engineering (CPE) and with Pine Creek Software.

5b. As a result of the decision by the ADAS Project Office (PO), changing of the AWOS/ADAS ICD by VNTSC to permit the AWOS/ADAS link protocol implementation as it presently exists.

For problem in section 5.1.3, C.6, the following additional steps were performed:

4c. Reviewing the testing/problem with CPE.

5c. Modification of the ADAS software by CPE to recognize and properly handle the hex FE octet in the RVR field, and installation of this software change in ADAS.

For problem in section 5.1.3, C.7 above, the following additional steps were performed:

4d. Reviewing the testing/problem with CPE and the ADAS PO.

5d. Generation of a patch to the ADAS SW by CPE to temporarily eliminate transmission by ADAS of an error message.

6d. Installation of the patch in ADAS.

Final adjudication of this problem rests with the ADAS PO. Since the AWOS and ASOS stations do not handle the error message but just discard it, it is believed that the ADAS PO will recommend that the ADAS SW be permanently modified to eliminate transmission of the error message. Also, as discussed in the resolution of the related problem C.SD3., transmission of the error message(s) by ADAS leads to ADAS mission cycle overruns and ADAS automatic shutdowns.

For problem C. SD1 above, varying configurations were attempted involving Motorola 530 to EIA-530 conversion cable (see explanation of problem C. SD2 below), hard shielded universal and Y cable, ribbon cable, EIA-530 to EIA-232 converters, a CPE Motorola 530 to EIA-232 converter. None of the configurations proved satisfactory except for the CPE converter which worked for awhile and then failed. Discussions with CPE confirmed the inability of the CTMs to provide sufficient additional current for the reduced impedance engendered by the parallel connection. It was decided to use only the Digilog Model 900 Protocol Analyzer (PA) for line monitoring since this PA provides line receivers and drivers to effect an in-series connection of the line monitoring function. The capability to quickly monitor various interfaces was achieved by configuring switches to connect different ADAS interface channels to the PA input and to connect the PA output to various AWOS/ASOS circuit modems and to the NADIN node.

For problem C. SD2 above, it was resolved by the CPE agreement to provide for each CTM Communications Channel, a cable which converts tne ADAS Motorola 530 pin assignments to those of the EIA-530 standard. ACW-200A fabricated such cables for purposes of the ADAS OT&E communications testing, but would have strongly preferred that such conversion was not necessary since it significantly complicated the configuring/reconfiguring required for communications testing. Finally, the noncompliance of the ADAS 530 interface is now a moot point since

a. the ADAS Project Office has recently decided to change all ADAS/AWOS(ASOS) interfaces to standard EIA-232,

b. the NADIN node can accept either an EIA-530 or an EIA-232 interface.

For problem C. SD3 above, the frequency of automatic shutdowns has been reduced by an order of magnitude or more. It is conjectured that this improvement is due to the elimination by ADAS of error message transmission since, when such transmission occurred, the offending station would not acknowledge/respond to the error message (I frame). (For every I frame sent by ADAS, ADAS expects an I frame in response with correct sequence numbers, and either that I frame or a succeeding RR frame with the F bit = 1). This caused the ADAS ICC to reset the link to that station by sending the Set Normal Response Mode (SNRM) command, and, after receiving the Unnumbered Acknowledgement (UA) Response with F = 1 from that station, to signal (flag) the ADAS CPU. This causes an interrupt in the mission cycle processing (application) software, and, since the previously sent error message was not responded to, this software precipitates retransmission of the error message and a repetition of the above pattern. Each servicing by the CPU of an ICC interrupt, which could occur every few seconds for any given ICC Channel, reduces the CPU time available to perform the other mission cycle functions and could lead to mission cycle overrun.

5.1.4 ADAS/ASOS Interface Testing.

A. Location of ASOS Stations Used for Interface Testing

1. Brooksville (Hernando County Airport), FL (Note 4)
2. Leesburg (Continental Jet Airport), FL (Note 4)
3. New Port Richey (Tampa Bay/Odessa), FL (Note 4)
4. Destin (Fort Walton Beach), FL (Note 4)
5. SMI, Hunt Valley, MD

Note 4: One of five drops, four of which are connected, on circuit with bridge in Jacksonville, FL.

B. Final (Current) Interface Status

1. Brooksville, FL - Partially Operational (Note 5).
2. Leesburg, FL - Partially Operational (Note 5).
3. New Port Richey, FL - Partially Operational (Note 5).
4. Destin, FL - Partially Operational (Note 5).
5. Marianna, FL (Note 4) - Non-Operational (Not connected).
6. SMI, Hunt Valley, MD - Fully Operational.

Note 5: Partially Operational due to the fact that occasionally each station either by itself, or in conjunction with one or more others on the circuit, transmits in response to an ADAS command an Frame Reject (FRMR) frame, an aborted frame, a frame with an FCS error, or nothing at all.

C. System Design Problems Encountered

1. After operating successfully for varying periods ranging from a few hours to a few days, one or more of the four connected ASOS stations on the Florida circuit failed to respond properly to an ADAS command, as noted above, by repeatedly sending FRMR frames, frames with FCS errors, aborted frames, or nothing at all. Usually, all stations fail at the same time exhibiting a variety of the above symptoms.

2. The Station Identifier of the Automated SAO Format Weather Message received from the ASOS stations was three characters in length whereas the ADAS Weather Data Processing (WDP) software can only handle a four-character Station Identifier. Note that the AWOS(ASOS)/ADAS Revision C, dated August 20, 1990, stipulates a fixed four-character field for the Station Identifier whereas the AWOS(ASOS)/ADAS ICD Revision C, dated January 15, 1993, stipulates a variable field of three or four characters.

3. The Observation Type Code of the Automated SAO Format Weather Message received from the ASOS stations is a TA (for Test) rather than one of the four permissible Observation Type Codes (SA, RS, SP, USP) specified in each of the AWOS(ASOS)/ADAS ICDs referenced immediately above.

D. Methods/Changes Used to Resolve Problems

1. Extensive investigation and experimental evaluation have been directed toward the resolution of the problem described in section 5.1.3, C.1. The three principal questions are: (a) What causes the ASOS stations to fail in their communications with ADAS? (b) Why do these stations hang in their failed mode? and (c) When the stations hang, regardless of the cause, what can be done about immediately restoring them to proper communications with ADAS? Since the Florida stations operate successfully without problems for varying periods of up to days at a time, it is deemed unlikely that the problem lies with either the ADAS or the ASOS implementation of the link protocol.

ADAS, after a period of an unsuccessful response from any given ASOS station to a series of ADAS RR commands, will properly revert to the transmission of a continuing series of (unnumbered) SNRM commands to which it does not get the proper response, the Unnumbered Acknowledge (UA) response.

The ASOS station at SMI, Hunt Valley, MD, has been communicating successfully without problems since it was connected in early May 1993. This reinforces the belief that the failures of the Florida stations are related to their multidrop configuration. Since the failures occur at irregular intervals, it appears quite possible that these failures are due to transient problems (maybe caused in part by weather phenomena) in the ASOS circuit which comprises a New Jersey Bell link from the FAA Technical Center, American Telephone and Telegraph (AT&T) Long Lines to the bridge (hubber) at Jacksonville, the bridge, the Florida Bell links (legs) from the bridge to the stations, and the modems at the stations. It is also possible that there is a transient problem(s) in the station's hardware/software implementation of its I/O link to ADAS which could, for example, cause its modem to fail in the transmit mode, thus bringing down the entire circuit. Further, note that the circuit used is voice grade, and not specially conditioned for digital traffic and thus with a higher Bit Error Rate (BER) than a conditioned circuit would provide. However, the use of this circuit is realistic from a testing standpoint since present plans entail all ADAS interfaces to ASOS and AWOS stations to use voice grade lines.

ACW-200A has worked closely with GTE and MCI, responsible for the entire circuit and modems, in periodically checking the modems and each circuit component including the bridge. Various legs have been deleted and restored to the bridge to enable testing of the circuit with various configurations of one, two, three, and four legs. On occasion, various links of the circuit have been found to be noisy and have been repaired. The bridge has been suspected of being noisy and it has been replaced. On occasion, the failure of all stations on the circuit has been traced to a streaming modem where the transmit carrier is always on. On these occasions, the modem has been replaced. On other occasions, the problem was felt to be with the Ready to Send (RTS)-Clear to Send (CTS) timing strapping of the modem which caused the transmit carrier to come up too quickly (8.3 milliseconds (ms)). On these occasions, the modem was restrapped so that the transmit carrier would come up after 66.7 ms.

In order to provide the most convenient environment for controlled evaluation and diagnosis of problem C.1, section 5.1.3, action has been taken to install a dedicated (leased) voice grade multidrop circuit between the ADAS at the FAA Technical Center and the number of ASOS test stations at the SMI facility in Hunt Valley, MD. Intensive testing will start immediately after installation which is expected within a month.

With respect to the restoration of a hung ASOS station(s) to satisfactory communications with ADAS (including the transmission of weather messages), it has been found that invariably, except on one occasion, the remote resetting from the ASOS PO in Silver Spring, MD, of the Florida ASOS station ADAS I/O port logic (hardware/software/ firmware) has been successful. On many occasions, such remote resetting of one station will also clear the trouble with other hung stations on this circuit. The NWS acknowledges there is a problem with the ASOS station hanging and intends to address this problem. It is recommended that a watchdog timer be incorporated in each ASOS station which would, upon expiration, perform the same resetting function as is now done remotely. This timer could be continually reset by the ADAS I/O software/firmware every time that an RR frame or an I frame is transmitted by the station, and would only expire if such a reset does not occur. This timer would thus cope with a station hangup due to any phenomenon, not only those due to circuit/bridge/modem aberrations. Admittedly, the timer treats the symptom of station hangup rather than the cause, but it may enable the station to be up more than 98 percent of the time and satisfy functional and performance requirements. This suggestion has been discussed at length with both the NWS and SMI, and is presently under consideration.

2. In regard to problem C.2., pertaining to the length of the station identifier in the Automated SAO Format Weather Message, the NWS agreed that the length should be fixed at four characters. SMI has already generated the required ASOS station software change and has successfully introduced it into the ASOS stations at Hunt Valley, MD, and on the Florida ASOS circuit.

3. In regard to problem C.3., pertaining to the use of TA for designation of a Test Message in the observation type field of the Automated SAO Format Weather, it has been recommended that the ADAS software be modified to recognize this designation. Such a modification would enable the ADAS weather data processing of test messages and the dissemination to WMSCR of these messages with the appropriate test indication thus providing a string check of proper system operation.

5.1.5 ADAS/NADIN II Interface Testing.

A. Location of NADIN Nodes Used for Interface Testing

1. NADIN II A node located at the FAA Technical Center with all connections to users within the FAA Technical Center.

2. NADIN II B node located at the FAA Technical Center connected to the NADIN node at the Sector Field Office (SFO) in Atlanta, GA.

B. Final (Current) Interface Status

1. NADIN II A node - Fully Operational

2. NADIN II B node - Fully Operational

C. System Design Problems Encountered

1. The values of some ADAS Network/Packet Layer (X.25) parameters did not agree with those of their NADIN counterparts.

2. The ADAS network addresses for ADAS and for the NADIN users with which ADAS communicates did not agree with their NADIN counterparts.

D. Methods/Changes Used to Resolve Problems

1. ADAS provided the values of its X.25 parameters to NADIN and NADIN adjusted its parameters to achieve compatibility.

2. ADAS provided its network addresses to NADIN and NADIN adjusted its addresses to achieve compatibility.

5.1.6 ADAS/MPS Interface Testing Via NADIN II.

A. Location of MPS Used for Interface Testing

The ACTA MPS located at the FAA Technical Center was used for the interface testing, and except for the String Testing, which is covered in section VIII below, was connected to ADAS via NADIN node A.

B. Final (Current) Interface Status

The ADAS interface to the MPS via NADIN has been fully operational for many weeks.

C. System Design Problems Encountered

1. The MPS network addresses the MPS and the ADAS did not agree with those established by ADAS/NADIN negotiation.

2. The values of some MPS Transport Layer (TP4) parameters were not compatible with those of their ADAS counterparts.

3. The MPS calling and called Transport Service Access Point Identifier (TSAP-ID) addresses did not agree with those established within ADAS for the MPS.

D. Methods/Changes Used to Resolve Problems

1. MPS modified its network addresses to correspond to those established by ADAS/NADIN negotiation.

2. MPS modified the values of its transport layer parameters to agree with those of ADAS.

3. MPS modified its TSAP-ID addresses to agree with those established within ADAS.

5.1.7 ADAS/WMSCR Interface Testing Via NADIN II.

A. Location of WMSCR Nodes Used for Interface Testing

1. WMSCR node A located in the National Aviation Weather Processing Facility (NAWPF) in the NADIN building at Atlanta, Georgia.

2. WMSCR node B located in the National Aviation Weather Processing Facility (NAWPF) in the NADIN building at Salt Lake City, Utah.

B. Final (Current) Interface Status

1. WMSCR Node A - Partially Operational (Note 6)

2. WMSCR Node B - Partially Operational (Note 6)

Note 6: Partially operational due to a WMSCR problem which requires correction. (See problem C.4 below.)

C. System Design Problems Encountered

1. (Both Nodes). The WMSCR network addresses for WMSCR and for ADAS did not agree with those established by ADAS/NADIN negotiation.

2. (Both Nodes). The WMSCR TSAP-ID addresses did not agree with the ADAS calling and called TSAP-ID addresses. Neither ADAS nor WMSCR agrees with the ADAS/WMSCR ICD which states in paragraph 20.1, "The WMSCR and ADAS shall be identified by a Transport Selector of 7, indicating a nonstandard Transport User."

3. (Both Nodes). Occasionally, after the NADIN connection to WMSCR (at the NADIN/WMSCR site) has been broken and then reestablished, the WMSCR continually sends a Transport Protocol Data Unit (TPDU) Disconnect Request (DR) code to ADAS in response to a TPDU Connection Request (CR) code transmitted by ADAS (to WMSCR). This necessitates a manual reset of WMSCR, after which full ADAS/WMSCR communication resumes.

4. A discrepancy exists between the WMSCR/ADAS IRD and ICD. The IRD, paragraph 3.1.1.1.1, "Periodic Connection Establishment" states The ADAS will request an application layer connection with the WMSCR in four cases:

a. Hourlies - at a specific configurable time for the transmission of hourly reports.

b. Specials - whenever a critical weather parameter changes and special report is to be issued....

c. The ICD, paragraph 3.2.1.2.3 "Disconnection" states Under normal circumstances, ADAS and WMSCR maintain a continuous connection. The WMSCR and ADAS application entities shall use the Transport Layer disconnect service only for internal reasons which exclude maintenance of communications with its peer. (For example, system shutdown.)

d. If the connection fails, the ADAS application shall initiate the connection establishment procedure in section 3.2.1.2.1 The ADAS implementation is in accordance with the ICD.

5. A discrepancy exists between the WMSCR/ADAS IRD and ICD. The IRD, paragraph 3.1.1.1.2 "Alternate Connections" states that If the ADAS is unable to establish a transport connection with the WMSCR with which it communicates, it will attempt to establish a connection with the other WMSCR. The ICD makes no mention of this requirement.

D. Methods/Changes Used to Resolve Problems

1. WMSCR adjusted its network addresses for the WMSCR nodes and for ADAS to agree with those established by ADAS/NADIN negotiation.

2. ADAS modified its 2-byte TSAP-ID parameter value (address) for WMSCR, the called address used by ADAS in a CR TPDU to WMSCR, to agree with the 1-byte TSAP-ID address expected by WMSCR. WMSCR modified its software to accept the 2-byte calling TSAP-ID address sent by ADAS in the CR TPDU. Both ADAS and WMSCR remain at variance with the ADAS/WMSCR ICD.

3. WMSCR acknowledges that, in accordance with the Transport Layer class 4 (TP4) protocol, the WMSCR TP4 should implement an inactivity timer (Watchdog Timer) which, upon expiration, will sever the WMSCR Transport connection. Without this feature, the WMSCR TP4 will stay connected, and therefore not accept the CR TPDU from ADAS (or any NADIN user).

4. The WMSCR Test Team has advised ACW-200A that the ADAS implementation is satisfactory.

5. Although the IRD requirement can be literally satisfied by the manual initiation at ADAS of a connection to the alternate WMSCR (which has in fact been successfully done during ADAS/WMSCR testing), the inference from the IRD is that this process should be automatic. (Otherwise, why state anything in the IRD on this matter?) There are potential methods of satisfying the IRD implied requirement. One possible approach entails making use of the NADIN Call Redirect capability. Another approach, which appears straightforward, would entail, upon failure of the present WMSCR connection, the ADAS software changing the WMSCR (network) address called by ADAS to that of the other WMSCR site. The fact that the existing WMSCR link has failed is already available to the ADAS software via the WMSCR Logical Unit (LU) 2B (hex) (interface connection status) Data Point (DP) in the (ADAS) Remote Monitoring Subsystem (RMS). The changing (by the software) of the WMSCR address is analogous to software invoked when the specialist (manually) changes the address on the WMSCR Edit Adaptation Parameters menu of the ADAS Specialist Console (ASC).

This problem has been referred to the ADAS and WMSCR project offices for resolution.

5.1.8 ADAS/DLP Testing Via NADIN II.

A. Location of DLP Used for Interface Testing

The DLP located at the FAA Technical Center was used for interface testing via the NADIN II A Node..

B. Final (Current) Interface Status

Although the DLP successfully receives via NADIN the (X.25) Call Request Packet generated by ADAS, the ADAS/DLP Interface is nonoperational due to the fact that the present DLP Build 1 software does not fully comply with the NAS IRD for X.25 Packet Mode Users, NAS-IR-43020001. This IRD is cited as a governing document in paragraph 3.1.1 of the DLP/ADAS ICD. (See problem C.2 discussed below.)

C. System Design Problems Encountered

1. The DLP network addresses for the DLP and for ADAS did not agree with those established by ADAS/NADIN negotiation.

2. ADAS generates an (X.25) Call Request Packet which DLP responds to with a Call Accepted Packet which includes a 6-hex character address in the Called Address Extension Field. However, ADAS expects the 26-hex character address it provided in the Call Request Packet, and not receiving this, generates a Clear Request Packet.

D. Methods/Changes Used to Resolve Problems

1. The DLP adjusted their network addresses for ADAS and the DLP to agree with those established by ADAS/NADIN negotiation.

2. Since modification of the DLP Build 1 software to correct this problem would be complicated/time-consuming and since this Build 1 software is not to be fielded, it was agreed by ADAS and DLP personnel that the Build 1 software would not be modified but that the Build 2 software would definitely provide the proper 26-character address in the Called Address Extension Field. The DLP Program Office is generating a letter to this effect to the ADAS Program Office.

5.1.9 "End-to-End String" Test.

A. The String test consisted of

1. transmitting weather data derived from live and IPS-emulated AWOS and ASOS stations to WMSCR via NADIN II, concurrent with

2. the reporting by ADAS to the MPS via NADIN II of Remote Maintenance and Monitoring (RMM) messages comprising

a. alarms/alerts/Return to Normals (RTNs) as they occur,

b. ADAS status and performance parameters in response to MPS commands.

B. Location of Nodes Used for Interface Testing

1. ADAS located at the FAA Technical Center

2. WMSCR Node A located at the NAWPF, Atlanta, GA

3. ACTA MPS located at the FAA Technical Center

4. NADIN II Node B located at the FAA Technical Center

5. NADIN II Node located at the NAWPF, Atlanta, GA

C. Final (Current) Interface Status

The String test was entirely successful with all involved interfaces fully operational, and weather and RMM messages properly communicated.

D. System Design Problems Encountered

Since the MPS had been used for other purposes for a short interval preceding the String test, it was necessary to make some minor MPS software adjustments including the network addresses within MPS for ADAS and the MPS.

E. Methods/Changes Used to Resolve Problems

MPS made the required adjustments.

5.2 CATEGORY B DATA INPUT.

The following sections present results and discussion for the Category B data input tests.

5.2.1 Test B1: CTS Simulated.

The successful conduct of test B2 with a live CTS eliminated the need to conduct test B1 with a simulated CTS.

5.2.1.1 Data Reduction and Analysis of Test B2 Data.

The successful conduct of test B2 with a live CTS eliminated the need to conduct test B1 with a simulated CTS.

5.2.2 Test B2: CTS Live.

As a result of the data collection and analysis performed for test B2, the following information is presented to demonstrate the data reduction and analysis steps taken for each requirement, and the specific data used to evaluate that requirement.

5.2.2.1 Data Reduction and Analysis of Test B2 Data

The following information is presented in the same format as the test B2 Data Reduction and Analysis (DR&A) steps for each requirement as listed in section 7 of the ADAS OT&E Test Procedure document. After each DR&A step, supporting data and/or discussion of the data is provided.

Pass Fail

a. [X] [] There should be Event Log entries for the two changes of the CTS interface; initial loss of connection, and the subsequent reconnection.

```
INPUT MESSAGE LOG - TEST ID: B2_ctsl    VERS: 2

INPUT MESSAGE #:         177

RECEIVE TIME (IPS):      12/16/92 00:05:46
RECEIVE TIME (ADAS):     12/16/92 00:05:46
SIMULATOR ID:                   3
MESSAGE TYPE:            SIM_EVENT_DATA
MESSAGE SIZE:                 776
GROUP ID:                       0
MESSAGE TYPE: Simulated Command Response - Event Log Data
EVENT PRIORITY: non-critical    DATE/TIME STAMP: 12-15-92 23:44:09
EVENT SEQ. NUMBER: 33    EVENT TYPE: 10      CSC ID: 2.1
Status of the signal on the CTS interface has changed.

comm status: enabled-active

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

INPUT MESSAGE #:         178

RECEIVE TIME (IPS):      12/16/92 00:05:47
RECEIVE TIME (ADAS):     12/16/92 00:05:47
SIMULATOR ID:                   3
MESSAGE TYPE:            SIM_EVENT_DATA
MESSAGE SIZE:                 776
GROUP ID:                       0
MESSAGE TYPE: Simulated Command Response - Event Log Data
EVENT PRIORITY: non-critical    DATE/TIME STAMP: 12-15-92 23:46:48
EVENT SEQ. NUMBER: 421    EVENT TYPE: 10      CSC ID: 2.1
Status of the signal on the CTS interface has changed.

comm status: enabled-failed

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

```
INPUT MESSAGE #:        179

RECEIVE TIME (IPS):     12/16/92 00:05:48
RECEIVE TIME (ADAS):    12/16/92 00:05:48
SIMULATOR ID:                3
MESSAGE TYPE:           SIM_EVENT_DATA
MESSAGE SIZE:                776
GROUP ID:                    0
MESSAGE TYPE: Simulated Command Response - Event Log Data
EVENT PRIORITY: non-critical    DATE/TIME STAMP: 12-15-92 23:49:02
EVENT SEQ. NUMBER: 440    EVENT TYPE: 10      CSC ID: 2.1
Status of the signal on the CTS interface has changed.

comm status: enabled-active
```

The three ADAS Event Log entries indicate that the CTS interface was enabled "active" at the start of the test, then "inactive" when the CTS cable was disconnected, and then "active" when the cable was reconnected.

b. [X] [] An Event Log entry will show that ADAS time was synchronized to the CTS time if a drift of 6 seconds or more occurred during the disconnection. Verify that the time difference between ADAS and CTS prior to the resynchronization was 6 seconds or greater (I: 3.2.1.2.8.4.b and II: 3.2.1.2.8.4.c).

An event type 9 was recorded by ADAS, indicating the ADAS time was reset. The test was first run with a time difference of +31 seconds, which ADAS successfully detected, and corrected. The test was then repeated a second time with a time difference of -5 seconds, which yielded identical results.

c. [X] [] Compare the simulated CTS time sent to ADAS with the ADAS system time for the entire length of the test. With the exception of the period of time that CTS was disconnected, verify that ADAS remained synchronized within 6 seconds of CTS for the entire test (I: 3.2.1.2.8.4.c and II: 3.2.1.5.8.2.8, first part).

d. [X] [] Verify that the time-stamps, in the printout of the ADAS Event Log, indicate 1-second timing resolution (II: 3.2.1.5.8.2.8, second part).

e. [X] [] Verify that UTC time was received by ADAS. An indication of the ADAS time sync in the ADAS Event Log occurs because ADAS is receiving UTC (II: 3.2.1.5.8.1.7).

f. [X] [] Verify that the synchronized ADAS system time was used to support archiving, data base maintenance, and data dissemination. Each ADAS SAO Archive Log entry is time-stamped (II: 3.2.1.5.8.1.7).

Data used in this report shows time-tagged ADAS data in the SAO archive and incoming message logs for WMSCR, DLP, and RWP.

Data from this test, as well as dry-run data, clearly demonstrate that the ADAS:

a. provides interface capabilities to CTS,

b. synchronizes in accordance with the requirements of NAS SS-1000,

c. synchronizes and resynchronizes to within 6 seconds of CTS,

d. receives and maintains system timing synchronized to UTC to support archiving, database maintenance and dissemination.

Therefore, the ADAS was found to be in accordance with the four CTS-related NAS-SS-1000 requirements and the four requirements are considered fully verified.

5.2.3 Test B3: Weather Input, Simulated and Live.

As a result of the data collection and analysis performed for test B3, the following information is presented to demonstrate the data reduction and analysis steps taken for each requirement, and the specific data used to evaluate that requirement.

The data presented after each DR&A step was extracted from the IPS Incoming and Outgoing Message Logs captured during the running of test B3_WIS or live Category A testing, and reformatted for use in this report.

5.2.3.1 Data Reduction and Analysis of Test B3 Data.

The following information is presented in the same format as the DR&A steps for each requirement as listed in section 7 of the ADAS OT&E Test Procedure document.

The results presented here were derived by tracing the output of each of the AWOS simulators used in this test, and locating the resultant message in the DLP, RWP, or WMSCR Incoming Message Log, while verifying corresponding time tags in each. The statistics and/or information providing verification is listed below each requirement. Where needed, data from other OT&E tests is used below to provide further verification of the requirement. Key data within the data sets is bolded.

Pass Fail

a. [X] [] The DLP and RWP logs must indicate that all 137 AWOS format messages from each cycle were received (1644 total) (II: 3.2.1.5.8.2.1.2).

STATISTICS OUTPUT FOR TEST ID: B3_wis

DLP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	**Messages Input:**	**1644**
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0
RWP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	**Messages Input:**	**1644**
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0

The data presented indicates that the ADAS accepts data from up to a maximum of 137 sites per ADAS. The test was run for 12 minutes, with 137 AWOSs simulated, each one providing a single weather message per minute to ADAS. Therefore, the total number of messages received at DLP or RWP should be:

(1 message/minute x 137 AWOS x 12 minutes) = 1644 messages

The data presented shows receipt of this number of messages, thus proving that ADAS is in accordance with the requirement to accept data from up to 137 sites. The requirement is therefore passed and considered fully verified.

b. [X] [] Verify that some of the messages received by ADAS (and subsequently sent to WMSCR) contained input from specialists, including remarks or annotations to the existing weather information, and that ADAS accepted this data (I: 3.2.1.1.4.1.e, first part).

The following is sampling of SAO MESSAGES received at the WMSCR Incoming Message Log in the IPS that contain remarks:

R094 SP 0236 ASOS 014 SCT 2 1/2 997/72/41/1521G35/992/ 329 2MMMM 48142

R04RVR50 TWR VSBY 07 PWINO PCPN 0 WSHFT 10

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz *

R089 SP 0237 ASOS 014 SCT 2 1/2 997/72/41/1521G35/992/ 329 2MMMM 48142
R04RVR50 TWR VSBY 07 PWINO PCPN 0 WSHFT 10

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz *

R085 SP 0237 ASOS 014 SCT 2 1/2 997/72/41/1521G35/992/ 329 2MMMM 48142
R04RVR50 TWR VSBY 07 PWINO PCPN 0 WSHFT 10

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz *

R086 SP 0237 ASOS 014 SCT 2 1/2 997/72/41/1521G35/992/ 329 2MMMM 48142
R04RVR50 TWR VSBY 07 PWINO PCPN 0 WSHFT 10

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz *

R090 SP 0237 ASOS 014 SCT 2 1/2 997/72/41/1521G35/992/ 329 2MMMM 48142

R04RVR50 TWR VSBY 07 PWINO PCPN 0 WSHFT 10

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz *

R092 SP 0237 ASOS 014 SCT 2 1/2 997/72/41/1521G35/992/ 329 2MMMM 48142
R04RVR50 TWR VSBY 07 PWINO PCPN 0 WSHFT 10

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz *

R082 SP 0237 ASOS 014 SCT 2 1/2 997/72/41/1521G35/992/ 329 2MMMM 48142
R04RVR50 TWR VSBY 07 PWINO PCPN 0 WSHFT 10

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz *

R080 SP 0237 ASOS 014 SCT 2 1/2 997/72/41/1521G35/992/ 329 2MMMM 48142
R04RVR50 TWR VSBY 07 PWINO PCPN 0 WSHFT 10

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz *

The data presented indicates that ADAS successfully received and accepted messages that contained input from specialists. Furthermore, some live data received by ADAS during Category A interface testing contained remarks. This requirement is therefore passed and considered fully verified.

c. [X] [] Verify that the ADAS accepted specialists commands to generate specific weather products (I: 3.2.1.1.4.1.e, second part).

The following data was collected from the WMSCR incoming message log:

R009 USP 0238 AWOS 100 BKN 7FUNNEL CLOUD 000/72/42/0405G15/998/

R074 USP 0238 ASOS 014 SCT 2 1/2 TORNADO 997/72/41/1521G35/992/
329 2MMMM 48142 R04RVR50 TWR VSBY 07PWINO PCPN 0 WSHFT 10 *

The data presented indicates the generation of specific weather product as a result of AWOS specialists' commands regarding the sighting of a funnel cloud at site R009, and a tornado at site R074. This requirement is therefore passed and considered fully verified.

d. [X] [] Verify that ADAS accepted AWOS weather data at a maximum rate of once per minute per site (I: 3.2.1.2.4.a.5; II: 3.2.1.5.8.1.1; II: 3.2.1.5.8.2.1.1.a).

STATISTICS OUTPUT FOR TEST ID: B3_wis

DLP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	1644
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0
RWP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	1644
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0

The data presented indicates that the ADAS accepts data at a rate of once per minute per site. The test was run for 12 minutes, with 137 AWOSs simulated, each one providing a single weather message per minute to ADAS. Therefore, the total number of messages received at DLP or RWP should be:

(1 message/minute x 137 AWOS x 12 minutes) = 1644 messages

The data presented shows receipt of this number of messages, thus proving that ADAS does accept data at the rate of one message per minute per site.

Note that further evidence that this requirement is met has been witnessed by the ADAS test team while performing Category A interface testing. Data collected in the ADAS SAO Archive and the IPS DLP Incoming Message Log while ADAS was connected to a live AWOS at OTIS AFB, Cape Cod, Massachusetts, has been reviewed and verified.

Both the simulated and live data collected show ADAS accepts data at the rate specified by NAS-SS-1000. The requirement is therefore passed and considered fully verified.

e. [X] [] Verify that ADAS accepted NWS ASOS data at a maximum rate of once per minute per site (I: 3.2.1.2.4.a.4.d and II: 3.2.1.5.8.2.1.1.b).

STATISTICS OUTPUT FOR TEST ID: B3_wis

DLP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	**Messages Input:**	**1644**
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0
RWP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	**Messages Input:**	**1644**
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0

The data presented indicates that the ADAS accepts data at a rate of once per minute per ASOS site. Of the 137 sites simulated in this test, 69 were ASOSs. The test was run for 12 minutes, with 137 inputs simulated, each one providing a single weather message per minute to ADAS. Therefore, the total number of messages received at DLP or RWP should be:

(1 message/minute x (68 AWOS + 69 ASOS) x 12 minutes) = 1644 messages

The data presented shows receipt of this number of messages, thus proving that ADAS does accept data at the rate of one message per minute per ASOS site.

Further evidence that this requirement is verified has been shown by data collected in the IPS DLP Incoming Message Log while ADAS was connected to live ASOS subsystems in Brookville and Leesburg, Florida. This data, which has been reviewed and verified by the ADAS test team, was collected during the conduct of ADAS End-to-End live String testing.

Both the simulated and live data collected show ADAS accepts ASOS data at the rate specified by NAS-SS-1000. The requirement is therefore passed and considered fully verified.

f. [X] [] Verify that ADAS accepted hourly observations and special observations in SAO format from NWS ASOS (II: 3.2.1.5.8.2.1.1.b).

Any AWOS with a simulator number of 69 or higher was an ASOS as demonstrated by the fact that they output twice as many messages as the number of polls received. For instance, in the following data, the 12 Messages Input are polls from ADAS, and 24 Messages Output are the 12 AWOS format messages and 12 SAO format messages sent to ADAS in response to the poll:

STATISTICS OUTPUT FOR TEST ID: B3_wis

AWOS SIMULATOR ID:	**69**	Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	**Messages Input:**	12
Last Active Response Set:	1	**Messages Output:**	24
Last Active Command Cell:	2	Error Messages Input:	0

The IPS statistics output for AWOS simulator IDs 70 through 137 are identical.

The following data presents a sampling of special messages received by the WMSCR simulator from some of these ASOS simulators (all with site IDs higher than 68):

R073 SP 0236 ASOS 014 SCT 2 1/2 997/72/41/1521G35/992/ 329 2MMMM 48142 R04RVR50 TWR VSBY 07 PWINO PCPN 0 WSHFT 10 *

R077 USP 0236 ASOS 014 SCT 2 1/2 TORNADO 997/72/41/1521G35/992/ 329 2MMMM 48142 R04RVR50 TWR VSBY 07PWINO PCPN 0 WSHFT 10 *

R089 SP 0236 ASOS 014 SCT 2 1/2 997/72/41/1521G35/992/ 329 2MMMM 48142 R04RVR50 TWR VSBY 07 PWINO PCPN 0 WSHFT 10

ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz *

R103 SA 0236 ASOS 150 SCT 5 997/72/41/1521G35/992/ 329 2MMMM 48142 R04RVR50 TWR VSBY 07PWINO PCPN 0 WSHFT 10 *

R115 SA 0236 ASOS 150 SCT 5 997/72/41/1521G35/992/ 329 2MMMM 48142 R04RVR50 TWR VSBY 07PWINO PCPN 0 WSHFT 10 *

R120 SA 0236 ASOS 150 SCT 5 997/72/41/1521G35/992/ 329 2MMMM 48142 R04RVR50 TWR VSBY 07PWINO PCPN 0 WSHFT 10 *

R122 SA 0236 ASOS 150 SCT 5 997/72/41/1521G35/992/ 329 2MMMM 48142 R04RVR50 TWR VSBY 07PWINO PCPN 0 WSHFT 10 *

R137 SA 0236 ASOS 150 SCT 5 997/72/41/1521G35/992/ 329 2MMMM 48142 R04RVR50 TWR VSBY 07PWINO PCPN 0 WSHFT 10 *

The data presented shows hourly and special messages received by ADAS from ASOS subsystems.

Further evidence that this requirement is verified has been shown by the data collected in the IPS WMSCR Incoming Message Log while ADAS was connected to live ASOS subsystems in Brookville and Leesburg, Florida. This data, which has been reviewed and verified by the ADAS test team, was collected during the conduct of ADAS End-to-End live String testing.

Both the simulated and live data collected show ADAS accepts ASOS hourly and special messages. The requirement is therefore passed and considered fully verified.

g. [X] [] Verify that the ADAS accepted data from up to 137 sites (II: 3.2.1.5.8.2.1.2).

STATISTICS OUTPUT FOR TEST ID: B3_wis

DLP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	1644
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0
RWP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	1644
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0

The data presented indicates that the ADAS accepts data at a rate of once per minute per site. The test was run for 12 minutes, with 137 AWOSs simulated, each one providing a single weather message per minute to ADAS. Therefore, the total number of messages received at DLP or RWP should be:

(1 message/minute x 137 AWOS x 12 minutes) = 1644 messages

The data presented shows receipt of this number of messages, thus proving that ADAS does accept data from 137 sites. The requirement is therefore passed and considered fully verified.

h. [X] [] Verify that ADAS is capable of updating its database at such rates as to be able to receive 137 surface observations per minute (II: 3.2.1.5.8.2.3).

STATISTICS OUTPUT FOR TEST ID: B3_wis

DLP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	1644
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0
RWP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	1644
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0

Data and discussion from steps a, d, e, g, and h above all demonstrate that ADAS is in accordance with this requirement, which is therefore passed and considered fully verified.

i. [X] [] Verify that ADAS collected and/or sensed weather data that pertains to the area of NAS responsibility for terminal and enroute operations (I: 3.2.1.1.4.1.b).

The sampling of weather data messages listed for the above steps provides verification of this requirement, which is therefore passed and considered fully verified.

j. [X] [] Verify that the ADAS accepts information from external weather subsystems (verification of the above steps provide verification of this requirement) (I: 3.2.1.1.4.1.a).

5.3 CATEGORY C DATA PROCESSING.

The following sections present results and discussion for the Category C data processing tests.

5.3.1 Test C1: General Data Processing.

As a result of the data collection and analysis performed for test C1, the following information is presented to demonstrate the steps taken and the specific data used to evaluate each requirement.

The data presented after each DR&A step was extracted from the IPS Incoming and Outgoing Message Logs captured during the running of test C1_GPRC, and reformatted for use in this report.

5.3.1.1 Data Reduction and Analysis of Test C1 Data.

The following information is presented in the same format as the DR&A steps for each requirement as listed in section 7 of the ADAS OT&E Test Procedure document.

The results presented here were derived by tracing the output of each of the AWOS simulators used in this test, and locating the specific, resultant SP SAO messages in the WMSCR Incoming Message Log, while verifying corresponding time tags in each. The Special SAO format messages generated by ADAS are listed below each requirement.

Pass Fail

a. [X] [] Verify that simulator #1 AWOS messages resulted in the generation of ceiling specials as the ceiling value crossed the 3000-, 1000-, and 500- foot thresholds (II: 3.2.1.5.8.2.2.3.a.1, a.2, and a.3, respectively).

R001 SP 0135 AWOS **9** BKN 7 000/72/42/0405G15/998/
R001 SP 0136 AWOS **16** BKN 7 000/72/42/0405G15/998/
R001 SP 0138 AWOS **30** BKN 7 000/72/42/0405G15/998/
R001 SP 0140 AWOS **28** BKN 7 000/72/42/0405G15/998/
R001 SP 0143 AWOS **7** BKN 7 000/72/42/0405G15/998/
R001 SP 0144 AWOS **2** BKN 7 000/72/42/0405G15/998/
R001 SP 0145 AWOS **9** BKN 7 000/72/42/0405G15/998/
R001 SP 0146 AWOS **16** BKN 7 000/72/42/0405G15/998/
R001 SP 0148 AWOS **30** BKN 7 000/72/42/0405G15/998/

The ceiling height value in each special message above is bolded. The value is in hundreds of feet. Each of the nine messages shown above was generated as a result of the ceiling value crossing the following levels, respectively: 500+, 1000+, 3000+, 3000-, 1000-, 500-, 500+, 1000+, and 3000+. (The + or - indicates the direction in which the threshold was crossed.) All of the expected special messages were generated, and therefore the three ceiling-related requirements were passed.

b. [] [X] Verify that simulator #1 AWOS messages resulted in the generation of RVR specials as the 10-minute RVR value crossed the 2400-foot threshold (II: 3.2.1.5.8.2.2.3.g).

Due to an indication of possible problems with RVR special generation during the conduct of test C1, a new test sequence was designed and built to further exercise the ADAS' ability to generate RVR-related special messages. This sequence ran for 15 minutes, varying the RVR parameter between 2100 and 2700 feet. No special message was generated (see PTR # OTE-066). This requirement is therefore FAILED.

c. [X] [] Verify that simulator #2 AWOS messages resulted in the generation of a Thunderstorm Special each time the message indicated a thunderstorm at the AWOS site (thunderstorm begin - TB), no thunderstorm at the AWOS site (thunderstorm end - TE), or a change in the thunderstorm intensity (T+) (II: 3.2.1.5.8.2.2.3.e).

R002 SP 0134 AWOS 100 BKN 7T+ZR 000/72/42/0405G15/998/ZRB34

R002 USP 0136 AWOS M 7TORNADO FUNNEL CLOUD

000/72/42/0405G15/998/TB36TE36 LB36LE36PB36PE36ZRB34SB36

R002 USP 0140 AWOS M 7TORNADO FUNNEL CLOUD

000/72/42/0405G15/998/TB36TE36TB40TE40LB36LE36LB40LE40

R002 USP 0144 AWOS M 7TORNADO FUNNEL CLOUD

000/72/42/0405G15/998/TB36TE36TB40TE40TB44TE44LB36LE36

R002 USP 0148 AWOS M 7TORNADO FUNNEL CLOUD

000/72/42/0405G15/998/TB36TE36TB40TE40TB44TE44TB48TE48

Additional data from the test D1 Sequence:

R003 SP 2358 AWOS 100 BKN 7T 000/72/42/0405G15/998/TB58

R003 SP 2359 AWOS 100 BKN 7T 000/72/42/0405G15/998/TB58TE59

The above collected data demonstrates that the ADAS generates special messages in response to Thunderstorm Begin (i.e., TB58), End (i.e., TE59), and Increase in Intensity (i.e., T+). Therefore, the thunderstorm-related requirement was passed and fully verified.

d. [X] [] Verify that simulator #2 AWOS messages resulted in the generation of a precipitation special each time the message indicated freezing rain at the AWOS site (freezing rain begin), no freezing rain (freezing rain end), or change in freezing rain intensity (II: 3.2.1.5.8.2.2.3.f.2).

R002 SP 0134 AWOS 100 BKN 7T+ZR 000/72/42/0405G15/998/ZRB34

Additional data from the test D1 sequence:

R003 SP 0005 AWOS 100 BKN 7ZR 000/72/42/0405G15/998/

RE01LB02LE03PB04PE05ZRB06

R003 SP 0006 AWOS 100 BKN 7ZR 000/72/42/0405G15/998/

RE01LB02LE03PB04PE05ZRB06ZRE07

The above collected data demonstrates that the ADAS generates special messages in response to Freezing Rain Begin (i.e., ZRB34) and End (i.e., ZRE07). Freezing Rain Increase in Intensity (i.e., ZR+) was not exercised by this test as planned, but will be evaluated during regression testing, prior to ADAS commissioning. The freezing rain-related requirement was therefore passed, and considered partially verified.

e. [X] [] Verify that simulator #2 AWOS messages resulted in the four events (Type 21) in the ADAS Event Log for the post-dated AWOS messages. Also verify that ADAS performed reasonableness checks on the other erroneous messages sent by simulator #2 (II: 3.2.1.5.8.2.2.6).

The following ADAS Event Log entries were captured in the IPS Incoming Message Log. These were logged in response to the erroneous AWOS messages sent to ADAS from simulated AWOS R002:

```
        INPUT MESSAGE #:        169

        RECEIVE TIME (IPS):     12/17/92 01:49:48
        RECEIVE TIME (ADAS):    12/17/92 01:49:48
        SIMULATOR ID:                 3
        MESSAGE TYPE:           SIM_EVENT_DATA
        MESSAGE SIZE:                776
        GROUP ID:                      0
        MESSAGE TYPE: Simulated Command Response - Event Log Data
EVENT PRIORITY: non-critical    DATE/TIME STAMP: 12-17-92 01:36:03
EVENT SEQ. NUMBER: 443    EVENT TYPE: 21      CSC ID: 11.2
An erroneous message has been triggered by System Logging.

interface id: R002  message type: ADAS received erroneous message
error type: AWOS weather message   error code: WDP bad field data:
    cloud amount error
    original csc id: 8.1  error number: 1
    error offset: 0

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
        INPUT MESSAGE #:        170

        RECEIVE TIME (IPS):     12/17/92 01:49:49
        RECEIVE TIME (ADAS):    12/17/92 01:49:49
        SIMULATOR ID:                 3
        MESSAGE TYPE:           SIM_EVENT_DATA
        MESSAGE SIZE:                776
        GROUP ID:                      0
        MESSAGE TYPE: Simulated Command Response - Event Log Data
EVENT PRIORITY: non-critical    DATE/TIME STAMP: 12-17-92 01:40:04
EVENT SEQ. NUMBER: 475    EVENT TYPE: 21      CSC ID: 11.2
An erroneous message has been triggered by System Logging.

interface id: R002  message type: ADAS received erroneous message
error type: AWOS weather message  error code: WDP bad field data:
    cloud amount error
    original csc id: 8.1  error number: 2
    error offset: 106
```

```
    INPUT MESSAGE #:        171

    RECEIVE TIME (IPS):     12/17/92 01:49:50
    RECEIVE TIME (ADAS):    12/17/92 01:49:50
    SIMULATOR ID:                3
    MESSAGE TYPE:           SIM_EVENT_DATA
    MESSAGE SIZE:                776
    GROUP ID:                    0
    MESSAGE TYPE: Simulated Command Response - Event Log Data
EVENT PRIORITY: non-critical    DATE/TIME STAMP: 12-17-92 01:44:03
EVENT SEQ. NUMBER: 508    EVENT TYPE: 21      CSC ID: 11.2
An erroneous message has been triggered by System Logging.

    interface id: R002  message type: ADAS received erroneous message
    error type: AWOS weather message error code: WDP bad field data:
    cloud amount error
    original csc id: 8.1  error number: 3
    error offset: 212

- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

    INPUT MESSAGE #:        172

    RECEIVE TIME (IPS):     12/17/92 01:49:50
    RECEIVE TIME (ADAS):    12/17/92 01:49:50
    SIMULATOR ID:                3
    MESSAGE TYPE:           SIM_EVENT_DATA
    MESSAGE SIZE:                776
    GROUP ID:                    0
    MESSAGE TYPE: Simulated Command Response - Event Log Data
EVENT PRIORITY: non-critical    DATE/TIME STAMP: 12-17-92 01:48:03
EVENT SEQ. NUMBER: 541    EVENT TYPE: 21      CSC ID: 11.2
An erroneous message has been triggered by System Logging.

    interface id: R002  message type: ADAS received erroneous message
    error type: AWOS weather message error code: WDP bad field data:
    cloud amount error
    original csc id: 8.     error number: 4
    error offset: 318
```

The time-tags on the messages correctly correspond to those in the "bogus" AWOS messages. These event log entries demonstrate that ADAS does convert AWOS format messages to SAO format, and perform reasonableness checks on the incoming AWOS messages. The ADAS therefore meets this requirement, and the requirement is considered fully verified.

f. [X] [] Verify that simulator #3 AWOS messages resulted in the generation of Sky Condition Specials as the indicated cloud layer height crosses the 1000- and 500-foot thresholds (II:3.2.1.5.8.2.2.3.b.1, and b.2, respectively).

R003 SP 0135 AWOS 9 BKN 7 000/72/42/0405G15/998/

R003 SP 0138 AWOS 3 BKN 7 000/72/42/0405G15/998/

R003 SP 0144 AWOS 5 BKN 7 000/72/42/0405G15/998/

R003 SP 0147 AWOS 11 BKN 7 000/72/42/0405G15/998/

The cloud layer height value in each special message above is bolded. The value is in hundreds of feet. Each of the four messages shown above was generated as a result of the cloud layer value crossing the following levels, respectively: 1000-, 500-, 500+, and 1000+. (The + or - indicates the direction in which the threshold was crossed.) All of the expected special messages were generated, and therefore the two sky condition-related requirements were passed and considered fully verified.

g. [X] [] Verify that simulator #4 AWOS messages resulted in the generation of a Wind Speed Special 2 minutes after the indicated wind speed increases from 20 to 50 knots (II: 3.2.1.5.8.2.2.3.d).

R004 SP 0139 AWOS 100 BKN 7 000/72/42/0450G15/998/

R004 SP 0145 AWOS 100 BKN 7 000/72/42/0450G15/998/

These two special messages were generated by ADAS in response to a sudden increase in wind speed. In conjunction with the wind-related test performed in test C2, the wind-related special message generation requirement is passed, and considered fully verified.

h. [] Failed Test (see Note middle of next page) [X] Verify that simulator #5 AWOS messages resulted in the generation of Visibility Specials as the 3-, 2-, 1.5- and 1-mile thresholds were crossed (II: 3.2.1.5.8.2.2.3.c.1, c.2, c.3, and c.4, respectively).

R005 SP 0136 AWOS 100 BKN 1 1/4 000/72/42/0405G15/998/

R005 SP 0137 AWOS 100 BKN 1 3/4 000/72/42/0405G15/998/

R005 SP 0138 AWOS 100 BKN M 000/72/42/0405G15/998/

R005 SP 0141 AWOS 100 BKN 1 3/4 000/72/42/0405G15/998/

R005 SP 0142 AWOS 100 BKN 1 1/4 000/72/42/0405G15/998/

R005 SP 0143 AWOS 100 BKN 3/4 000/72/42/0405G15/998/

R005 SP 0146 AWOS 100 BKN 1 1/4 000/72/42/0405G15/998/

R005 SP 0147 AWOS 100 BKN 1 3/4 000/72/42/0405G15/998/

R001 SP 0207 AWOS 100 BKN 1 1/4 000/72/42/0405G15/998/

R001 SP 0208 AWOS 100 BKN 1 3/4 000/72/42/0405G15/998/

R001 SP 0208 AWOS 100 BKN **M** 000/72/42/0405G15/998/

R001 SP 0211 AWOS 100 BKN **M** 000/72/42/0405G15/998/

R001 SP 0212 AWOS 100 BKN **M** 000/72/42/0405G15/998/

R001 SP 0213 AWOS 100 BKN 1 3/4 000/72/42/0405G15/998/

R001 SP 0215 AWOS 100 BKN 1 1/4 000/72/42/0405G15/998/

R001 SP 0216 AWOS 100 BKN 1 1/4 000/72/42/0405G15/998/

R001 SP 0217 AWOS 100 BKN 1 3/4 000/72/42/0405G15/998/

This test was run twice; once with the visibility values varying between 0.25 and 2.25 miles, and once varying between .25 and 3.25 miles.

Note the above special messages produced by ADAS, with the visibility values bolded. Each of these messages was generated at the proper time, as each of the visibility thresholds were crossed. However, the visibility values for the 2- and 3-mile thresholds are missing. This is considered a failure for requirements (II: 3.2.1.5.8.2.2.3.c.1, and c.2). Requirements c.3 and c.4 were passed and considered fully verified.

i. [ ] [X] Verify that the ADAS successfully classifies all weather information as hazardous if it may impact flight operations (if DR&A steps (a) through (h) above pass, then this requirement is also considered to be verified) (II: 3.2.1.1.4.1.g).

Some of the above weather processing-related requirements were failed, this requirement by definition also fails. This requirement will be considered passed and fully verified when all other weather processing-related requirements are passed.

5.3.2 Test C2: Wind and Pressure.

As a result of the data collection and analysis performed for test C2, the following information is presented to demonstrate the steps taken and the specific data used to evaluate each requirement.

The data presented after each DR&A step was extracted from the IPS Incoming and Outgoing Message Logs captured during the running of test C2_W+PR, and reformatted for use in this report.

5.3.2.1 Data Reduction and Analysis of Test C2 Data.

The following information is presented in the same format as the DR&A steps for each requirement as listed in section 7 of the ADAS OT&E Test Procedure document.

The results presented here were derived by tracing the output of each of the AWOS simulators used in this test, and locating the specific, resultant SP SAO message in the WMSCR Incoming Message Log, while verifying corresponding time tags in each. The special SAO format messages generated by ADAS are listed below each requirement. The corresponding AWOS output messages can be found in the test data files listed in appendix D.

Pass Fail

a. [X] [] Verify that simulator #1 AWOS messages resulted in the generation of Wind Shift Specials after 15 minutes run time (II. 3.2.1.5.8.2.2.3.d).

R001 SP 0114 AWOS 100 BKN 7 000/72/42/1020G15/998/WSHFT 14

The special message shown above was generated by ADAS exactly after 15 minutes of run time, as the wind shifted from 10 to 100°. This requirement is therefore passed and considered fully verified.

b. [X] [] Verify that simulator #2 AWOS messages DID NOT result in the generation of any Wind Specials (II: 3.2.1.5.8.2.2.3.d).

No Special (i.e., SP) messages were generated as a result of the inputs from R002. Therefore, in conjunction with the results from simulator #1 (R001), this requirement is passed and considered fully verified.

c. [X] [] Verify that simulator #3 AWOS messages resulted in the generation of Pressure Specials when: the pressure rose greater than 0.005 inHg per minute for a rise of at least 0.02 inHg; and when the pressure remained at that value or higher for 20 minutes; and when one of these types of pressure jumps (.005 inHg/min, total rise >.02 inHg) is distinctly separated from any other jump by at least 20 minutes (II: 3.2.1.5.8.2.2.3.h.1, h.2 and h.3, respectively).

R003 SP 0121 AWOS 100 BKN 7 000/72/42/0405G15/003/PRJMP 03/0102/0121 PRESFR

This pressure-related special message was generated as expected:

The first pressure jump from 29.98 @ 00:59, to 30.04 @ 01:03 (a rise of .01 inHg per minute for a total rise of 0.06 inHg) caused the "PRJMP 03" portion of this message;

The second pressure jump from 29.99 @ 01:20, to 30.03 @ 01:21 did meet the jump criteria stated above, AND was separated from the other jump by 20 minutes, thus producing the "0121 PRESRF" portion of the message.

This requirement is therefore passed and considered fully verified. It is recommended that further testing be performed on the ADAS generation of pressure-related specials, due to the ambiguity of the requirement, and the many different types of pressure specials ADAS is supposedly capable of producing.

d. [X] [] Verify that the ADAS successfully classifies all weather information as hazardous if it may impact flight operations (if DR&A steps (a) through (d) above pass, then this requirement is also considered to be verified) (II: 3.2.1.1.4.1.g).

This requirement is passed since all other requirements for this test were passed. Note, however, that requirements in other tests that were failed, ultimately cause this requirement to be failed.

5.3.3 Test C3: Hail and Urgent Specials.

As a result of the data collection and analysis performed for test C3, the following information is presented to demonstrate the steps taken and the specific data used to evaluate each requirement.

The data presented after each DR&A step was extracted from the IPS Incoming and Outgoing Message Logs captured during the running of test C3_H+US, and reformatted for use in this report.

5.3.3.1 Data Reduction and Analysis of Test C3 Data.

The following information is presented in the same format as the DR&A steps for each requirement as listed in section 7 of the ADAS OT&E Test Procedure document.

The results presented here were derived by tracing the output of each of the AWOS simulators used in this test, and locating the specific, resultant SP and USP SAO messages in the WMSCR Incoming Message Log, while verifying corresponding time tags in each. The special SAO format messages generated by ADAS are listed below each requirement. The corresponding AWOS output messages can be found in the test data files listed in appendix D.

Pass Fail

a. [X] [] Verify that simulator #1 AWOS messages resulted in the generation of separate precipitation specials indicating hail begin, hail end, ice pellets begin, end, and change in ice pellet intensity (II: 3.2.1.5.8.2.2.3.f.1 (hail), and 3.2.1.5.8.2.2.3.f.3 (ice pellets)).

R001 SP 0914 AWOS 100 BKN 7IP 000/72/42/0405G15/998/IPB15

R001 SP 0915 AWOS 100 BKN 7IP 000/72/42/0405G15/998/IPB15

R001 SP 0917 AWOS 100 BKN 7IP 000/72/42/0405G15/998/IPB15

R001 SP 0918 AWOS 100 BKN 7IP 000/72/42/0405G15/998/IPB15

R001 SP 0919 AWOS 100 BKN 7IP 000/72/42/0405G15/998/IPB15

R001 SP 0921 AWOS 100 BKN 7IP 000/72/42/0405G15/998/IPB15IPE21

R001 SP 0922 AWOS 100 BKN 7A 000/72/42/0405G15/998/IPB15IPE21 AB22

R001 SP 0923 AWOS 100 BKN 7A 000/72/42/0405G15/998/IPB15IPE21 AB22AE23

The first Ice Pellets Begin (IPB) at 0914 was the result of the actual beginning of the indication that ice pellets were present at the AWOS site. The messages with time tags of 0915 through 0919 were a result of the intensity of the ice pellets changing. Although change of intensity is not actually indicated in the message itself (the ICD does not require this), the special messages were generated by ADAS each time the intensity changed. Therefore, the ice pellet-related requirement is passed and considered fully verified.

The messages time-tagged 0922 and 0923 show that the ADAS generated special messages in response to Hail Beginning (AB) and Hail Ending (AE). Therefore, the hail-related requirement is passed and considered fully verified.

b. [] [X] Verify that simulator #2 AWOS messages resulted in the generation of Urgent Special messages for tornado, water spout and funnel cloud sightings (II: 3.2.1.5.8.2.2.4).

R002 USP 0915 AWOS 100 BKN 7**TORNADO FUNNEL CLOUD** 000/72/42/0405G15/998/

R002 USP 0915 AWOS 100 BKN 7**FUNNEL CLOUD** 000/72/420405G15/998/

R002 USP 0917 AWOS 100 BKN 7**TORNADO WATERSPOUT** 000/72/42/0405G15/998/

R002 USP 0918 AWOS 100 BKN 7**WATERSPOUT** 000/72/42/0405G15/998/

R002 USP 0918 AWOS 100 BKN 7**TORNADO FUNNEL CLOUD** 000/72/42/0405G15/998/

R002 USP 0919 AWOS 100 BKN 7**FUNNEL CLOUD** 000/72/42/0405G15/998/

R002 USP 0921 AWOS 100 BKN 7**TORNADO** 000/72/42/0405G15/998/

R002 USP 0922 AWOS 100 BKN 7**TORNADO** 000/70/40/0302G09/998/

R002 USP 0923 AWOS 100 BKN **M** 000/75/45/0608G15/998/

R002 USP 0924 AWOS 100 BKN 7**FUNNEL CLOUD** 000/72/42/0405G15/998/

R002 USP 0925 AWOS 100 BKN 7**FUNNEL CLOUD** 000/72/42/0405G15/998/

R002 USP 0926 AWOS 100 BKN 7**FUNNEL CLOUD** 000/72/42/0405G15/998/

R002 USP 0927 AWOS 100 BKN 7**FUNNEL CLOUD** 000/72/42/0405G15/998/

R002 USP 0927 AWOS 100 BKN 7**FUNNEL CLOUD** 000/72/42/0405G15/998/

R002 USP 0928 AWOS 100 BKN 7**FUNNEL CLOUD** 000/72/42/0405G15/998/

R002 USP 0930 AWOS 100 BKN 7**FUNNEL CLOUD** 000/72/42/0405G15/998/

R002 USP 0931 AWOS 100 BKN 7**FUNNEL CLOUD** 000/72/42/0405G15/998/

The test performed here provided AWOS messages to ADAS that indicated all combinations of urgent special conditions at the AWOS site. In each case, an urgent special message was generated, but in some cases, the word WATERSPOUT was missing from the body of the message. This was not found to be a significant failure since (1) the message was generated and sent, and (2) that some other words in the message indicated to the recipient that a tornado-type of weather condition exists. However, in the case where WATERSPOUT was the only indicator, and it was missing from the message, this was considered a failure (see the message time-tagged 0923 above with the M positioned where the word WATERSPOUT should go. Due to this finding, the ADAS is found to be not in accordance with the urgent special message generation requirement.

c. [ ] [X] Verify that the ADAS successfully classifies all weather information as hazardous if it may impact flight operations (if DR&A steps (a) through (c) above "pass," then this requirement is also considered to be verified) (II: 3.2.1.1.4.1.g).

This requirement is failed since the urgent special message generation requirement for this test was failed.

5.3.4 Test C4: Growth and Expandability.

As a result of the data collection and analysis performed, the following information is presented to demonstrate the data reduction and analysis steps taken for this requirement, and the data used for evaluation of that requirement.

5.3.4.1 Data Reduction and Analysis of Test C4 Data.

The following information is presented in a format similar to the DR&A steps for this test as listed in section 7 of the ADAS OT&E Test Procedure document.

Pass Fail

a. [X] [ ] Review the results of the ADAS hardware inspection. Verify that the amount of expandability and growth afforded by the existing ADAS hardware design is sufficient to accommodate a reasonable amount of system growth.

An inspection of the ADAS hardware was performed. The following information was gathered during the conduct of the inspection:

a. The amount of SBC on-board Random Access Memory (RAM) can be increased using the spare room on the board adjacent to the existing memory chips. Higher capacity memory chips could also be installed in place of the current memory chips on the Single Board Computer (SBC).

b. The existing processor (Motorola 68030) could be replaced with a higher speed processor (e.g., Motorola 68040).

c. The SBC is a Line Replaceable Unit and can be serviced such as to upgrade the processor and memory.

d. The same conclusion can be drawn for the front end of the system, as the ICCs could also be removed and upgraded with higher speed processors.

e. The ADAS design is sufficiently flexible to accommodate additional weather sensor inputs, being that the 8 ICCs each provide 6 input channels, with each channel providing 10 drops. This ultimately provides for inputs from up to 480 weather sensors (more than triple the current requirement). (Note that additional SBC and/or ICC Central Processing Unit (CPU) processing power may be required for ADAS to accept this number of inputs.)

f. In the event that ADAS expansion would need a significant amount of additional hardware, the existing 19-inch rack used to house the VME chassis would easily accommodate another VME chassis, leaving plenty of space for cables and air circulation.

This information was sufficient to pass the hardware inspection portion of the DR&A.

a. [X] [] Verify that the ADAS provides the capability and flexibility to support future growth and expandability (I: 3.2.1.1.4.1.c).

The information presented above under step a provides sufficient evidence that ADAS is in accordance with this requirement. The requirement is therefore passed and considered fully verified.

5.4 CATEGORY D DATA DISSEMINATION.

The following paragraphs address the data reduction and analysis of category D test data.

5.4.1 Test D1: Additive SAO (Pressure, Precipitation, and Wind).

The data contained in the data lists in this report are from the IPS Incoming and Outgoing Message Logs captured during the running of test D1_ASAO. The data lists reformatting facilitates analysis of the test data. Refer to the ADAS/AWOS ICD appendix 10 to decode the AWOS Message Contents.

5.4.1.1 Data Reduction of D1_ASAO Test Data.

The DR&A steps for Integration Test Procedures (ITPR) Test D1_ASAO (Additive SAO Reports for Pressure, Precipitation, and Wind SAO Dissemination Requirements) are as follows:

a. Verify that the ADAS derives pressure tendencies (II: 3.2.1.5.8.2.2.1.c).

R001 SA 2359 AWOS 100 BKN 7 100/72/42/0405G15/998/ MMM 2MMMM 4MMMM

R001 SA 0100 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0200 AWOS 100 BKN 7 230/72/42/0405G15/998/

R001 SA 0300 AWOS 100 BKN 7 250/72/42/0405G15/998/ 299 99150

R001 SA 0400 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0500 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0600 AWOS 100 BKN 7 180/72/42/0405G15/998/ 770 2MMMM 4MMMM

b. Verify that the ADAS generates hourly reports at an adaptive time, and appends the hourly message with a pressure tendency report every 3 hours beginning at 0000 UTC, for the past 3 hours (II: 3.2.1.5.8.2.2.5.c).

R001 SA 2359 AWOS 100 BKN 7 100/72/42/0405G15/998/ MMM 2MMMM 4MMMM

R001 SA 0100 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0200 AWOS 100 BKN 7 230/72/42/0405G15/998/

R001 SA 0300 AWOS 100 BKN 7 250/72/42/0405G15/998/ 299 99150

R001 SA 0400 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0500 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0600 AWOS 100 BKN 7 180/72/42/0405G15/998/ 770 2MMMM 4MMMM

c. Verify that the ADAS derives precipitation accumulation over adaptive periods (II: 3.2.1.5.8.2.2.1.b).

R002 SA 0000 AWOS 100 BKN 7 000/72/42/0405G15/998/
MMM 2MMMM 4MMMM PCPN 0009

R002 SA 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 0189

R002 SA 0200 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 0369

R002 SA 0300 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 PCPN 0549

R002 SA 0400 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 0729

R002 SA 0500 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 0909

R002 SA 0600 AWOS 100 BKN 7 000/72/42/0405G15/998/ 40034 THIRTY EIGHT
2MMMM 4MMMM PCPN 1089

d. Verify that the ADAS disseminates aeronautical/weather data, to users, that directly affects flight operations (I: 3.2.1.1.1.1.h).

DLP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	3948
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0
RWP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	3948
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0

```
WMSCR SIMULATOR:                                Events:                    0
Simulator State:              EXIT OK           Alarms:                    0
Station I/O State:            DISABLE           Messages Input:           94
Last Active Response Set:     1                 Messages Output:           0
Last Active Command Cell:     2                 Error Messages Input:      0
                                                Erroneous Messages Input:  0
```

e. Verify that the ADAS derives additive data remarks for pressure rising/falling rapidly, and pressure unsteady (II: 3.2.1.5.8.2.2.2).

R006 SP 0041 AWOS 100 BKN 7 000/72/42/0405G15/004/TB41 **PRES UNSTDY**

R006 SA 0100 AWOS 100 BKN 7 000/72/42/0405G15/000/TB41TB42 **PRESFR**

R006 SP 0117 AWOS 100 BKN 7 000/72/42/0405G15/000/**PRJMP** 02/0058/0117

R006 SA 0200 AWOS 100 BKN 7 000/72/42/0405G15/998/TB41TB42 **PRJMP** 02/0058/0117 PRESFR

f. Verify that the ADAS (NAS) performs all processing required to produce and/or complete a description of the current, trend, or predicted conditions by filtering, decoding, editing, and reformatting acquired weather data to facilitate its operational use by NAS specialists and users (I: 3.2.1.2.4.e.4).

This requirement has been verified during the analysis of the test data, by the inclusion of the test data excerpts in this report, and by the data in the ADAS OT&E Test Data files.

g. Verify that the ADAS disseminates current products and hourly products within 10 seconds of receipt of the data (II: 3.2.1.5.8.2.6.b).

```
OUTPUT MESSAGE #:       1

TRANSMIT TIME (IPS):  12/17/92 01:34:00
TRANSMIT TIME (ADAS): 12/17/92 01:34:00
TIME OFFSET:                  0
STATION ID:             10
MESSAGE TYPE:          ADAS_AWOS_MSG

INPUT MESSAGE #:         7

RECEIVE TIME (IPS):     12/17/92 01:34:04
RECEIVE TIME (ADAS):    12/17/92 01:34:04
SIMULATOR ID:                  2
MESSAGE TYPE:           DLP_AWOS_MSG

INPUT MESSAGE #:         8

RECEIVE TIME (IPS):     12/17/92 01:34:05
RECEIVE TIME (ADAS):    12/17/92 01:34:05
SIMULATOR ID:                  4
MESSAGE TYPE:           RWP_AWOS_MSG
```

INPUT MESSAGE #: 9

RECEIVE TIME (IPS): 12/17/92 01:34:05
RECEIVE TIME (ADAS): 12/17/92 01:34:05
SIMULATOR ID: 5
MESSAGE TYPE: WMSCR_SAO_SA

5.4.1.2 Data Analysis of D1_ASAO Test Data.

The analysis of the data from test D1 follows:

a. The marked data "299 99150," indicates a pressure increase of 15 mb during the last 3 hours.

b. The extracted data shows the hourly reports generated for AWOS simulator #1. The marked data, "MMM," "299 99150," and "770," indicate "missing data needed for calculation at the beginning," "15 mb increase in the first three hours," and a "7 mb decrease in the second 3 hours."

c. The marked data indicate reported 1-hour precipitation accumulations of 0.09, 1.89, 3.69, 5.49, 7.29, 9.09, and 10.89 inches.

d. The marked data indicates that the 10 AWOS simulators output a total of 3958 messages, and the DLP and RWP each received 3948 messages. Taking into account that the IPS test ended after the last 10 AWOS messages were sent, but prior to the output of the corresponding output message to the users, the numbers indicate that all messages were sent on to the users.

e. The marked data indicates a press unsteady report at 0041 followed by a pressure falling rapidly report in the next hourly report, and a pressure jump report at 0117 followed by a pressure jump report and a pressure falling rapidly report in the next hourly report.

f. The data used within this report show the processing, filtering, decoding, editing, and reformatting of acquired data to facilitate its operational use.

g. The time stamps on the outgoing AWOS message, the incoming WMSCR SAO message, the incoming DLP AWOS message, and the incoming RWP AWOS message, indicate that messages are sent within 10 seconds from the time the AWOS messages are sent.

5.4.2 Test D2: DLP, RWP, and WMSCR Data Dissemination.

The data contained in the Data Lists in this report is from the IPS Incoming and Outgoing Message Logs captured during the running of test D2_DRWD. The data lists reformatting facilitates analysis of the test data. Refer to the ADAS/AWOS ICD, appendix 10, to decode the AWOS Message Contents.

5.4.2.1 Data Reduction of D2_DRWD Test Data.

a. Verify that the ADAS disseminates aeronautical/weather data, to users, that directly affects flight operations (I: 3.2.1.1.1.1.h).

DLP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	225
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0
RWP SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	225
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0
WMSCR SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	18
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0
AWOS SIMULATOR ID: 1		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	46
Last Active Response Set:	1	Messages Output:	46
Last Active Command Cell:	6	Error Messages Input:	0
		Erroneous Messages Input:	0
AWOS SIMULATOR ID: 2		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	46
Last Active Response Set:	1	Messages Output:	46
Last Active Command Cell:	6	Error Messages Input:	0
		Erroneous Messages Input:	0
AWOS SIMULATOR ID: 3		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	47
Last Active Response Set:	1	Messages Output:	46
Last Active Command Cell:	9	Error Messages Input:	0
		Erroneous Messages Input:	0
AWOS SIMULATOR ID: 4		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	46
Last Active Response Set:	1	Messages Output:	45
Last Active Command Cell:	3	Error Messages Input:	0
		Erroneous Messages Input:	0

```
AWOS SIMULATOR ID:    5                    Events:                          0
Simulator State:              EXIT OK      Alarms:                          0
Station I/O State:            DISABLE      Messages Input:                 46
Last Active Response Set:     1            Messages Output:                46
Last Active Command Cell:     8            Error Messages Input:            0
                                           Erroneous Messages Input:        0
```

b. Verify that the ADAS disseminates surface observations to the RWP subsystem, minute-by-minute, hourly, and specials in AWOS format (I: 3.2.1.2.4.b.2 and II: 3.2.1.5.8.2.4.a).

```
RWP SIMULATOR:                             Events:                          0
Simulator State:              EXIT OK      Alarms:                          0
Station I/O State:            DISABLE      Messages Input:                225
Last Active Response Set:     1            Messages Output:                 0
Last Active Command Cell:     2            Error Messages Input:            0
                                           Erroneous Messages Input:        0
```

c. Verify that the ADAS disseminates surface observations to the WCP (DLP) subsystem, minute-by-minute, hourly, and specials in AWOS format (I: 3.2.1.2.4.b.2 and II: 3.2.1.5.8.2.4.b).

```
DLP SIMULATOR:                             Events:                          0
Simulator State:              EXIT OK      Alarms:                          0
Station I/O State:            DISABLE      Messages Input:                225
Last Active Response Set:     1            Messages Output:                 0
Last Active Command Cell:     2            Error Messages Input:            0
                                           Erroneous Messages Input:        0

INPUT MESSAGE #:      6

RECEIVE TIME (IPS):     12/17/92 18:25:16
RECEIVE TIME (ADAS):    12/17/92 18:59:05
SIMULATOR ID:                 2
MESSAGE TYPE:           DLP_AWOS_MSG
MESSAGE SIZE:               347
GROUP ID:                     0
MESSAGE TYPE: DLP Awos
ADU HEADER:                 145
ADU RECORD COUNT:             5

AWOS/ASOS ID:    R002          AWOS/ASOS CFG NO: 0
DATE:92/12/17 TIME:                 18:59:00
ALERT STATUS:

Sky Cond:    No    Visib Dec:  No    Hail Beg:    No    F Rain Beg: No
Ceiling Up:  No    Wind Dir    No    Hail End:    No    F Rain End: No
Ceiling Dn:  No    Wnd Spd Inc:No    Ice Beg:     No    F Driz Beg: No
Visib Inc:   No    Pres Jump:  No    Ice End:     No    F Driz End: No
Tstorm Beg:  No    Funnel:     No    Snow Beg:    No    NonSpec Beg:No
Tstorm End:  No    Spout:      No    Snow End:    No    NonSpec End:No
Tstorm Inc:  No    Svc Resume: No    Rain Beg:    No    Fog Beg:    No
Tornado:     No    Thresh Exc: No    Rain End:    No    Fog End:    No
```

CLOUD LAYERS:

1st Cloud Layer: 100 Obscured: No
Scattered: No Part Obscured: No
Broken: Yes Indef Ceiling: No
Overcast: No No Clouds: No
2nd Cloud Layer: 0 Obscured: No
Scattered: No Part Obscured: No
Broken: No Indef Ceiling: No
Overcast: No No Clouds: No
3rd Cloud Layer: 0 Obscured: No
Scattered: No Part Obscured: No
Broken: No Indef Ceiling: No
Overcast: No No Clouds: No

VISIBILITY: 700

Obstruct: No Gnd Fog: No Haze: Yes
Fog: No Ice Fog: No Smoke: No
Dust: No Blow Sand: No Blow Spry: No
Blow Snow: No Blow Dust: No
Future Use:No Future Use: No
Future Use:No Future Use: No
Future Use:No

OBSERVED PRECIPITATION: 0

Precip Non-Specific: 0 Rain Intensity: 0 Drizzle Intensity: 0
Frz Rain Intensity: 0 Frz Driz Intensity: 0 Ice Plt Intensity: 0
Snow Intensity: 0 Hail/Ice Crystals: 0

AMBIENT TEMP: 172
DEW POINT TEMP: 142
WIND DIRECTION: 1 True 4 Magnetic
WIND SPEED: 4 Avg 15 Gust
ATMOSPHERIC PRESSURE: 2998 inches Hg 0 Density Alt 10000 Sea Lvl Pres
RVR: 1-10s Deg 30-100s Ft
THUNDERSTORM ACTIVITY: Severe: No 10 miles or less: No Dir:

SITE STATUS:

Operator: No Test Mode: No Manual Msg: No Suspect Data: No

SENSOR/DATA STATUS:

Wind Direct: 0 Pressure: 0 Visibility: 0
Wind Speed: 0 Ceiling Hgt: 0 Lightning: 0
Ambient Temp: 0 Precip Occur: 0 Freeze Rain: 0
Dew Pt Temp: 0 Precip Accum: 0

PARAMETER ACTIVATION:

		Gnd Fog:	No	Haze:	No	Dust:	No
Fog:	No	Ice Fog:	No	Smoke:	No	Blow Snow:	No
Rain:	No	Frz Rain:	No	Ice Plts:	No	Ice Crys:	No
Drizzle:	No	Frz Driz:	No	Snow:	No	Hail:	No

AUTOMATED REMARKS:

Var visibility: No Var Wind: No Var ceil/sky: No

OPERATOR REMARKS:

d. Verify that the ADAS disseminates hourly and special surface observations to the WMSCR subsystem in SAO format (II: 3.2.1.5.8.2.4.c).

WMSCR SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	18
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0

e. Verify that the ADAS makes current surface weather observation information available to nonlocal area specialists and users and is updated at least once per hour (I: 3.2.1.2.4.b.4).

WMSCR SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	18
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0

5.4.2.2 Data Analysis of D2_DRWD Test Data.

a. The data indicates that the 5 AWOS simulators, a total of 229 messages, and the DLP and RWP simulators each received 225 messages. Taking into account that the IPS test ended after the last 10 AWOS messages were sent, but prior to the output of the corresponding output message to the users, the numbers indicate that all messages were sent on to the users.

b. The data indicates the RWP received all messages output by the AWOS simulators in AWOS format.

c. The data indicates the DLP received all messages output by the AWOS simulators in AWOS format.

d. The data indicates the WMSCR received all hourly and special AWOS messages output by the AWOS simulators in SAO format.

e. The data indicates the WMSCR received all hourly and special AWOS messages output by the AWOS simulators in SAO format. WMSCR data is passed to the NWS database, which is accessible by nonlocal area specialists and users.

5.4.3 Test D3: Additive SAO (Precipitation Accumulation).

The data contained in the Data Lists in this report is from the IPS Incoming and Outgoing Message Log captured during the running of test D1_ASAO. The data lists reformatting facilitates analysis of the test data. Refer to the ADAS/AWOS ICD appendix 10 to decode the AWOS Message Contents.

5.4.3.1 Data Reduction of D3_Pcip Test Data.

a. Verify that the ADAS (NAS) performs all processing required to produce and/or complete a description of the current, trend, or predicted conditions by filtering, decoding, editing, and reformatting acquired weather data to facilitate its operational use by NAS specialists and users (I: 3.2.1.2.4.e.4).

This requirement has been verified during the analysis of the test data, by the inclusion of the test data excerpts in this report.

b. Verify that the ADAS disseminates hourly and special surface observations to the WMSCR subsystem in SAO format (II: 3.2.1.5.8.2.4.c).

WMSCR SIMULATOR:		Events:	0
Simulator State:	EXIT OK	Alarms:	0
Station I/O State:	DISABLE	Messages Input:	125
Last Active Response Set:	1	Messages Output:	0
Last Active Command Cell:	2	Error Messages Input:	0
		Erroneous Messages Input:	0

c. Verify that the ADAS generates hourly reports at an adaptive time and appends the hourly message with a 6-hour precipitation accumulation report every 6 hours beginning at 0000 UTC (II: 3.2.1.5.8.2.2.5.d.1).

R001 SA 0559 AWOS 100 BKN 7 000/72/42/0405G15/998/ 40080 THIRTY SEVEN 2MMMM 4MMMM PCPN 1080

R001 SA 1200 AWOS 100 BKN 7 000/72/42/0405G15/998/ 40060 TWO 2MMMM 4MM72 PCPN 2160

R001 SA 1759 AWOS 100 BKN 7 000/72/42/0405G15/998/ 40040 SEVEN 2MMMM 472MM PCPN 3240

R001 SA 0000 AWOS 100 BKN 7 000/72/42/0405G15/998/ 40020 SBY TWO 254000 47272 PCPN 4320

d. Verify that the ADAS generates hourly reports at an adaptive time and appends the hourly message with a 24-hour precipitation accumulation, reported at 1200 UTC (II: 3.2.1.5.8.2.2.5.d.2).

R001 SA 1200 AWOS 100 BKN 7 000/72/42/0405G15/998/ 40060 TWO 2MMMM 4MM72 PCPN 2160

R002 SA 1200 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 4MM72

R003 SA 1200 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 4MM72

R004 SA 1159 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 4MM72

R005 SA 1200 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 4MM72

e. Verify that the ADAS generates hourly reports at an adaptive time and appends the hourly message with a 1-hour precipitation accumulation, reported hourly (II: 3.2.1.5.8.2.2.5.d.3).

R001 SA 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 0180

R001 SA 0200 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 0360

R001 SA 0300 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 PCPN 0540

R001 SA 0359 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 0720

R001 SA 0459 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 0900

R001 SA 0559 AWOS 100 BKN 7 000/72/42/0405G15/998/ 40080 THIRTY SEVEN 2MMMM 4MMMM PCPN 1080

R001 SA 0659 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 1260

R001 SA 0759 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 1440

R001 SA 0859 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 PCPN 1620

R001 SA 1000 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 1800

R001 SA 1100 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 1980

R001 SA 1200 AWOS 100 BKN 7 000/72/42/0405G15/998/ 40060 TWO 2MMMM 4MM72 PCPN 2160

R001 SA 1300 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 2340

R001 SA 1400 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 2520

R001 SA 1500 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 PCPN 2700

R001 SA 1600 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 2880

R001 SA 1659 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 3060

R001 SA 1759 AWOS 100 BKN 7 000/72/42/0405G15/998/ 40040 SEVEN 2MMMM 472MM PCPN 3240

R001 SA 1900 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 3420

R001 SA 1959 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 3600

R001 SA 2059 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 PCPN 3780

R001 SA 2200 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 3960

R001 SA 2259 AWOS 100 BKN 7 000/72/42/0405G15/998/PCPN 4140

R001 SA 0000 AWOS 100 BKN 7 000/72/42/0405G15/998/ 40020 SBY
TWO 254000 47272 PCPN 4320

f. Verify that the ADAS derives precipitation accumulation over adaptive periods (II: 3.2.1.5.8.2.2.1.b).

Refer to the data above in paragraph e.

5.4.3.2 Data Analysis of D3_Pcip Test Data.

a. The data used within this report show the processing, filtering, decoding, editing, and reformatting of acquired data to facilitate its operational use.

b. The data indicates the WMSCR received all hourly and specials AWOS messages output by the AWOS simulators in SAO format.

c. The data indicates that the hourly messages to WMSCR report 6-hour precipitation every 6 hours, starting at 0000 UTC. The values indicate 0.8", 0.6", 0.4", and 0.2" accumulation during the four 6-hour periods reported.

d. The data indicates that the hourly message at 1200 UTC reports the 24-hour precipitation accumulation.

e. The data indicates that hourly reports are generated with the 1-hour precipitation accumulation.

f. The data indicates that the ADAS derives precipitation accumulation over adaptive periods.

5.4.4 Test D4: Additive SAO Temperature and Pressure.

The data contained in the data lists in this report is from the IPS Incoming and Outgoing Message Log captured during the running of test D4_Temp. The data lists reformatting facilitates analysis of the test data. Refer to the ADAS/AWOS ICD, appendix 20, to decode the SAO format AWOS Message Contents.

5.4.4.1 Data Reduction of D4_Temp Test Data.

a. Verify that the ADAS generates hourly reports at an adaptive time and appends the hourly message with a report for the maximum temperature for the last 12 hours at 0000 UTC (II: 3.2.1.5.8.2.2.5.a.1).

R001 SA 0000 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 43035

R002 SA 0000 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 47240

R003 SA 2359 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 47272

R004 SA 0000 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 47272

R005 SA 0000 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 47272

b. Verify that the ADAS generates hourly reports at an adaptive time and appends the hourly message with a report for the maximum temperature for the last 24 hours at 0600 UTC (II: 3.2.1.5.8.2.2.5.a.2).

R001 SA 0600 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 43035

R002 SA 0600 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 47240

R003 SA 0600 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 47272

R004 SA 0600 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 47272

R005 SA 0559 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 47272

c. Verify that the ADAS generates hourly reports at an adaptive time and appends the hourly message with a report for the minimum temperature for the last 12 hours at 1200 UTC (II: 3.2.1.5.8.2.2.5.b.1).

R001 SA 1159 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 4MM72

R002 SA 1200 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 4MM72

R003 SA 1200 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 4MM72

R004 SA 1200 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 4MM72

R005 SA 1200 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 4MM72

d. Verify that the ADAS generates hourly reports at an adaptive time and appends the hourly message with a report for the minimum temperature for the last 24 hours at 1800 UTC (II: 3.2.1.5.8.2.2.5.b.2).

R001 SA 1800 AWOS 100 BKN 7 000/63/42/0405G15/998/ 400 2MMMM 430MM

R002 SA 1759 AWOS 100 BKN 7 000/-32/42/0405G15/998/ 400 2MMMM 435MM

R003 SA 1800 AWOS 100 BKN 7 000/72/42/0405G15/000/ 400 2MMMM 472MM

R004 SA 1800 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 472MM

R005 SA 1800 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 472MM

e. Verify that the ADAS generates hourly reports at an adaptive time and appends the hourly message with an hourly pressure unsteady report if the pressure varies by 0.03 inches from the mean trend (II: 3.2.1.5.8.2.2.5.e).

R003 USP 2240 AWOS 100 BKN 7FUNNEL CLOUD 000/72/42/0405G15/004/PRES UNSTDY

R003 SA 2259 AWOS 100 BKN 7 000/72/42/0405G15/998/PRESFR

f. Verify that the ADAS generates hourly reports at an adaptive time and appends the hourly message with an hourly pressure rise/fall rapidly report when the pressure rises/falls at a rate of 0.06 inches/hour or more with a total rise/fall of 0.02 inches (II: 3.2.1.5.8.2.2.5.f).

R003 USP 2240 AWOS 100 BKN 7FUNNEL CLOUD 000/72/42/0405G15/004/PRES UNSTDY

R003 SA 2259 AWOS 100 BKN 7 000/72/42/0405G15/998/PRESFR

g. Verify that the ADAS maintains weather trend information for the past 3 hours (I: 3.2.1.2.4.c.1).

The data included herein is from the paragraph above for Test D1 subparagraph b.

R001 SA 2359 AWOS 100 BKN 7 100/72/42/0405G15/998/ MMM 2MMMM 4MMMM

R001 SA 0100 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0200 AWOS 100 BKN 7 230/72/42/0405G15/998/

R001 SA 0300 AWOS 100 BKN 7 250/72/42/0405G15/998/ 299 99150

R001 SA 0400 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0500 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0600 AWOS 100 BKN 7 180/72/42/0405G15/998/ 770 2MMMM 4MMMM

h. Verify that the ADAS (NAS) performs all processing required to produce and/or complete a description of the current, trend, or predicted conditions by filtering, decoding, editing, and reformatting acquired weather data to facilitate its operational use by NAS specialists and users (I: 3.2.1.2.4.e.4).

This requirement has been verified during the analysis of the test data, by the inclusion of the test data excerpts in this report.

i. Verify that the ADAS derives minimum/maximum temperatures over an adaptive period and provides this as additive data (II: 3.2.1.5.8.2.2.1.a).

R001 SA 0559 AWOS 100 BKN 7 000/91/42/0405G15/998/ MMM 2MMMM 4MMMM

R001 SA 1159 AWOS 100 BKN 7 000/122/42/0405G15/998/ 400 2MMMM 4MMMM

R001 SA 1800 AWOS 100 BKN 7 000/63/42/0405G15/998/ 400 2MMMM 430MM

R001 SA 0000 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 2MMMM 43035

R001 SA 0600 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 43035

R001 SA 1159 AWOS 100 BKN 7 000/72/42/0405G15/998/ 400 4MM72

5.4.4.2 Data Analysis of D4_Temp Test Data.

a. The marked data indicates the maximum temperature for the last 12 hours is reported at 0000 UTC.

b. The marked data indicates the maximum temperature for the last 24 hours is reported at 0600 UTC.

c. The marked data indicates the minimum temperature for the last 12 hours is reported at 1200 UTC.

d. The marked data indicates the minimum temperature for the last 24 hours is reported at 1800 UTC.

e. The marked data indicates that ADAS detects and reports a pressure unsteady condition.

f. The marked data indicates that ADAS detects and reports a pressure falling rapidly condition.

g. The marked data indicates that ADAS maintains weather trend information for the past 3 hours.

h. The data used in this report show the processing, filtering, decoding, editing, and reformatting of acquired data to facilitate its operational use.

i. The marked data indicates that ADAS derives minimum and maximum temperatures over an adaptive period and provides this as additive data.

5.4.5 Test D5: Five-Second SAO Throughput Processing.

The data contained in the data lists in this report is from the IPS Incoming and Outgoing Message Log captured during the running of test D5_5sec. The Data Lists reformatting facilitates analysis of the test data. Refer to the ADAS/AWOS ICD, appendix 10, to decode the AWOS Message Contents.

5.4.5.1 Data Reduction of D5_5sec Test Data.

a. Verify that the ADAS maintains weather trend information for the past 3 hours (I: 3.2.1.2.4.c.1).

The data included herein is from the paragraph above for Test D1 subparagraph b.

R001 SA 2359 AWOS 100 BKN 7 100/72/42/0405G15/998/ MMM 2MMMM 4MMMM

R001 SA 0100 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0200 AWOS 100 BKN 7 230/72/42/0405G15/998/

R001 SA 0300 AWOS 100 BKN 7 250/72/42/0405G15/998/ 299 99150

R001 SA 0400 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0500 AWOS 100 BKN 7 220/72/42/0405G15/998/

R001 SA 0600 AWOS 100 BKN 7 180/72/42/0405G15/998/ 770 2MMMM 4MMMM

b. Verify that the ADAS disseminates specials within 5 seconds of receipt of the data (II: 3.2.1.5.8.2.6.a).

The test team was unable to cause a delay in the dissemination of specials. All specials were delivered within 5 seconds of reception of the AWOS message. The test team utilized a processing load utility to load down the UNIX system. The UNIX system continually crashed due to the processing load, but at all times before the system crash, all specials were disseminated within 5 seconds of reception.

5.4.5.2 Data Analysis of D5_5sec Test Data.

a. The marked data indicates that ADAS maintains weather trend information for the past 3 hours.

b. The test data indicates that the ADAS disseminates specials within 5 seconds of receipt of the data.

5.4.6 Test D6: Ten-Second SAO Throughput Processing.

The data contained in the Data Lists in this report is from the IPS Incoming and Outgoing Message Log captured during the running of test D6_10ST. The Data Lists reformatting facilitates analysis of the test data. Refer to the ADAS/AWOS ICD, appendix 10, to decode the AWOS Message Contents.

5.4.6.1 Data Reduction of D6_10ST Test Data.

a. Verify that the ADAS (NAS) performs all processing required to produce and/or complete a description of the current, trend, or predicted conditions by filtering, decoding, editing, and reformatting acquired weather data to facilitate its operational use by NAS specialists and users (I: 3.2.1.2.4.e.4).

This requirement has been verified during the analysis of the test data, by the inclusion of the test data excerpts in this report.

b. Verify that the ADAS disseminates current products and hourly products within 10 seconds of receipt of the data (II: 3.2.1.5.8.2.6.b).

The test team was unable to cause a delay in the dissemination of current and hourly products. All current and hourly products were delivered within 10 seconds of reception of the AWOS message. The test team utilized a processing load utility to load down the UNIX system. The UNIX system continually crashed due to the processing load, but at all times before the system crash, all current and hourly products were disseminated within 10 seconds of reception.

5.4.6.2 Data Analysis of D6_10ST Test Data.

a. The data used within this report, and listed in appendix D, show the processing, filtering, decoding, editing, and reformatting of acquired data to facilitate its operational use.

b. The test data indicates that ADAS disseminates current products and hourly products within 10 seconds of receipt of the data.

5.4.7 Test D7: Ten-Second AWOS Throughput Processing.

The data contained in the Data Lists in this report is from the IPS Incoming and Outgoing Message Log captured during the running of test D1_ASAO. The Data Lists reformatting facilitates analysis of the test data. Refer to the ADAS/AWOS ICD, appendix 10, to decode the AWOS Message Contents.

5.4.7.1 Data Reduction of D7_10AA Test Data.

a. Verify that the ADAS (NAS) performs all processing required to produce and/or complete a description of the current, trend, or predicted conditions by filtering, decoding, editing, and reformatting acquired weather data to facilitate its operational use by NAS specialists and users (I: 3.2.1.2.4.e.4).

This requirement has been verified during the analysis of the test data, by the inclusion of the test data excerpts in this report.

b. Verify that the ADAS disseminates current products and hourly products within 10 seconds of receipt of the data (II: 3.2.1.5.8.2.6.b).

The test team was unable to cause a delay in the dissemination of current and hourly products. All current and hourly products were delivered within 10 seconds of reception of the AWOS message. The test team utilized a processing load utility to load down the UNIX system. The UNIX system continually crashed due to the processing load, but at all times before the system crash, all current and hourly products were disseminated within 10 seconds of reception.

5.4.7.2 Data Analysis of D7_10AA Test Data.

a. The data used within this report show the processing, filtering, decoding, editing, and reformatting of acquired data to facilitate its operational use.

b. The test data indicates that ADAS disseminates current products and hourly products within 10 seconds of receipt of the data.

5.4.8 Test E1: SAO Archive.

As a result of the data collection and analysis performed as described above, the following information is presented to demonstrate the data reduction and analysis steps taken for each requirement and the data used to evaluate that requirement.

The data presented below was extracted from the IPS Incoming Message Logs for the MPS (SAO Archive Data). The data was captured during the running of test E1_ARTA and reformatted for use in this report.

5.4.8.1 Data Reduction and Analysis of Test E1 Data.

The following information is presented in the same format as the DR&A steps for each requirement as listed in section 7 of the ADAS OT&E Test Procedure document.

The results presented here were derived by spot checking and tracing the outputs of each of the AWOS simulators used in this test and locating the specific, resultant SP SAO messages in the WMSCR Incoming Message Log, while verifying corresponding time tags in each. The ADAS SAO Archive Log was then reviewed for the proper contents. Comparisons were made between the contents of the WMSCR Incoming Message Log and the contents of the SAO Archive in ADAS. Various messages were chosen at random for comparison to those in the WMSCR Log for appropriate time tags and contents. The corresponding AWOS output messages (see appendix D) were also reviewed.

Pass Fail

a. [X] [] Verify that the manual procedures for this test were successfully completed, particularly the display of the entire contents of the 15-day SAO archive file.

The manual procedures were successfully completed. The contents of the 15-day SAO archive file were displayed, including the first day which was later erased to make room for the 16th day's worth of data.

b. [X] [] Verify that the SAOs received by the WMSCR simulator (in the IPS) correctly received all SAOs sent by ADAS. (Compare the SAOs received by WMSCR to the messages sent by the five simulated AWOSs, and check for correct contents and time stamps).

See data below.

c. [X] [] Compare the contents of the archived SAO messages received by MPS to the SAO messages sent to WMSCR, and to the contents of the original AWOS messages and verify that the weather data and time stamp data in the archived SAOs are accurate and in the correct format.

See data below.

d. [X] [] Verify that ADAS archives weather information for use in event reconstruction and accident investigation (I: 3.2.1.1.4.1.n).

See data below.

e. [X] [] Verify that the NAS archives weather information in accordance with NAS-SS-1000, Volume I, paragraph 3.2.1.2.8.3 (I: 3.2.1.2.4.g).

See data below.

f. [X] [] Verify that the ADAS archives data (II: 3.2.1.5.8.1.5).

See data below.

g. [X] [] Verify that all ADAS generated messages were archived for a period of 15 days (II: 3.2.1.5.8.2.5).

The following data set shows that the three SAO format messages expected to be generated by ADAS each day (for each AWOS) were recorded in the SAO Archive Log. Due to the large amount of data collected, only the data from AWOS simulator #1 (R001) is shown below to keep the representative data set to a reasonable size. Note that an identical set of data was recorded in the Archive Log for each of the other four AWOS simulators (R002 through R005).

01/02/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59

01/02/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59ZRB00

01/02/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE01

01/03/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59

01/03/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59ZRB00

01/03/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE01

01/04/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59

01/04/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59ZRE00

01/04/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB01

01/05/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59

01/05/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59ZRB00

01/05/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE01

01/06/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59

01/06/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59ZRE00

01/06/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB01

01/07/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59

01/07/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59ZRB00

01/07/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE01

01/08/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59

01/08/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59ZRE00

01/08/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB01

01/09/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59

01/09/93 R001 RS 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59ZRB00

01/09/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE01

01/10/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59

01/10/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59ZRE00

01/10/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB01

01/11/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59

01/11/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59ZRB00

01/11/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE01

01/12/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59

01/12/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59ZRE00

01/12/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB01

01/13/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59

01/13/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59ZRB00

01/13/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE01

01/14/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59

01/14/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59ZRE00

01/14/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB01

01/15/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59

01/15/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB59ZRE00

01/15/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRB01

01/16/93 R001 SP 0059 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59

01/16/93 R001 RS 0100 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE59ZRB00

01/16/93 R001 SP 0101 AWOS 100 BKN 7 000/72/42/0405G15/998/ZRE01

The above data demonstrates that the ADAS archived the SAO messages generated by ADAS for a period of 15 days. Furthermore, extensive use of the ADAS system by the test team throughout OT&E and follow-on testing revealed no problems with the operation of the ADAS Archive Log. The four archiving requirements are therefore passed and considered fully verified.

5.4.9 Category F Tests - ADAS RMS to MPS Interface.

The complete report for Category F is contained in the Remote Monitoring Subsystem (RMS) Functional Test of the Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) Test Report document produced by ACN-100D. Only the high-level test objectives for Category F are contained in this report.

5.4.9.1 Data Reduction and Analysis Category F Test Data.

The complete report for Category F is contained in the Remote Monitoring Subsystem (RMS) Functional Test of the Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) Test Report document produced by ACN-100D. Only the high-level test objectives for Category F are contained in this report.

6. CONCLUSIONS.

6.1 CATEGORY A FUNCTIONAL/PHYSICAL SETUP.

A. The AWOS Data Acquisition System (ADAS) now communicates satisfactorily with Automated Weather Observation System (AWOS) stations configured on a point-to-point or on a two-station multidrop basis. This is in compliance with NAS-SS-1000, table 3.2.1.5.8.3-1 B, volume II and also in compliance with the most recent proposed revision to the AWOS/ADAS Interfase Control Document (ICD). (See Category A, Recommendation A in paragraph 7.1 below.) It is projected that ADAS will operate properly with many AWOS stations in a multidrop configuration.

B. The four Florida multidropped Automated Surface Observing System (ASOS) stations operate satisfactorily for varying periods (sometimes days). This is in compliance with NAS-SS-1000, table 3.2.1.5.8.3-1 G, volume II and also in compliance with the most recent proposed revision to the AWOS/ADAS ICD. (See Category A, Recommendation A in paragraph 7.1 below). However, there are still problems causing these stations to fail. It is possible that these failures are due to transients in the ASOS circuit which comprises links from three telephone companies, a bridge (hubber), and modems. Also, the Bit Error Rate (BER) of this voice grade circuit is considerably higher than a circuit conditioned for data transmission would provide. There is also a definite problem with the ASOS stations in that they hang in a state in which they will not properly communicate with ADAS. (See Category A, Recommendations D and F in paragraph 7.1 below.)

C. The ADAS X.25 interface to NAS Data Interchange Network II (NADIN II) operates properly and in compliance with the ADAS/NADIN ICD as evidenced by:

1. The successful ADAS/Maintenance Processor Subsystem (MPS) and ADAS/Weather Message Switching Center Replacement (WMSCR) communications via NADIN II, in compliance with NAS-SS-1000, table 3.2.1.5.8.3-1 E,F, and table 3.2.1.5.8.3-1 I, respectively,

2. The Call Request/Call Accepted packet exchange between ADAS and the Data Link Processor (DLP) via NADIN II in compliance with NAS-SS-1000, table 3.2.1.5.8-1 C.

D. The ADAS cannot successfully establish a network (X.25) layer connection via NADIN II to the DLP due to a deficiency in the DLP Build 1 software. With the correction of this deficiency in the DLP Build 2 software (see Category A, Recommendation E in paragraph 7.1 below), it is felt that a proper ADAS/DLP connection through NADIN II can be established and maintained.

E. ADAS can properly establish and maintain a transport layer connection (TP4-Transport Service Class 4), in accordance with CCITT X.224 and as specified in the WMSCR/ADAS and ADAS/MPS ICDs, with its NADIN II users as evidenced by successful

1. transmission of weather messages from ADAS to WMSCR,

2. exchange of reports and commands between ADAS and the MPS.

If the DLP (Build 2) and the RWP properly conform to the same TP4 requirements as invoked and implemented for ADAS, WMSCR, and the MPS, they too should successfully communicate with ADAS on a Transport Layer basis.

F. ADAS can successfully communicate on a peer application layer basis with its NADIN II users via the Transport Layer Interface (TLI), as defined in the American Telephone and Telegraph (AT&T) System V Interface, and making use of the transport primitive functions specified in the WMSCR/ADAS and ADAS/MPS ICDs. This is demonstrated by the successful transmission of weather messages by ADAS to WMSCR, and the exchange of reports and commands between ADAS and the MPS. If the DLP (Build 2) and the Real-Time Weather Processor (RWP) implement the same transport primitive functions as the ADAS, WMSCR, and the MPS, they too should fully communicate with ADAS and receive AWOS format weather messages from ADAS.

G. The ADAS/WMSCR Interface Requirements Document (IRD) and ICD are at variance on two communications-oriented issues:

1. The IRD discusses periodic application layer connection establishment between ADAS and WMSCR whereas the ICD states that this connection should be maintained under normal circumstances. (See Category A, Recommendation G in paragraph 7.1 below.)

2. The IRD implies that if ADAS is unable to establish a transport connection with the WMSCR with which it communicates, it should automatically attempt to establish a connection with the other WMSCR. (See Category A, Recommendation H in paragraph 7.1 below.)

H. Neither ADAS nor WMSCR agree with the ADAS/WMSCR ICD which states in paragraph 20.1 "The WMSCR and ADAS shall be identified by a Transport Selector of 7, indicating a nonstandard Transport User."

I. WMSCR occasionally incorrectly remains "hangs" in the transport layer even though the WMSCR NADIN connection has been broken for some period of time, thus rejecting new Transport connection attempts by ADAS.

J. Testing indicates that the ADAS is in full compliance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.1.a and the ADAS/Coded Time Source (CTS) ICD.

K. During the Functional Configuration Audit/Physical Configuration Audit (FCA/PCA), held at the prime contractor's facility in November 1992, the ADAS was found to be in full compliance with NAS-SS-1000 requirements 3.2.3.1, 3.3.1, 3.3.6.1.a, 3.3.6.1.b, 3.3.6.2, 3.3.7, 3.5.1, 3.6.1, and 3.6.2.

6.2 CATEGORY B DATA INPUT.

6.2.1 Test B1: Conclusions.

This test addressed the capture of Coordinated Universal Time (UTC) data from a simulated CTS subsystem. This test was not performed, however, since a live test is deemed to be more valuable in verifying test requirements. Test B2, which tests the same requirements as B1 (see below), was performed in lieu of test B1 since a live CTS input was available at the FAA Technical Center ADAS laboratory to support the ADAS Operational Test and Evaluation (OT&E) effort.

6.2.2 Test B2: Conclusions.

As a result of the data collection and analysis performed for test B2, the following conclusions are drawn:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.8.4.b in that the ADAS remains synchronized to within 6 seconds of UTC.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.8.4.c in that the ADAS provides interfacing capabilities to the coded time signal and synchronization in accordance with volumes II through V of NAS-SS-1000.

c. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.1.7 in that the ADAS receives and maintains system timing synchronized to UTC to support archiving, database maintenance, and dissemination.

d. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.8 in that the ADAS synchronizes to the NAS standard time reference in accordance with section 3.2.1.2.8.4 in volume I of NAS-SS-1000, and that the ADAS is capable of 1-second timing resolution.

In summary, the ADAS is fully verified to be in accordance with the four CTS-related requirements. No further testing in this area is needed.

6.2.2 Test B3: Conclusions.

As a result of the data collection and analysis performed for test B3, the following conclusions are drawn:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.1.4.1.a in that the ADAS accepts weather information from external subsystems that support National Airspace System (NAS) specialists and users.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.1.4.1.b in that the ADAS collects and/or senses weather information that pertains to the area of NAS responsibility for terminal and en route operations.

c. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.1.4.1.e in that the ADAS accepts input from specialists including annotations or remarks to existing weather information or commands to generate specific weather products.

d. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.a.4.d in that the ADAS collects National Weather Service (NWS) generated current weather observations, at least once every minute.

e. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.a.5 in that the ADAS collects Department of Defense (DOD) generated data on current surface weather observations at least once every minute.

f. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.1.1 in that the ADAS collects data from federal, non-Federal, and DOD AWOS and NWS ASOS.

g. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.1.1.a in that the ADAS accepts data from federal, non-Federal and DOD AWOS at a maximum rate of once per minute per site.

h. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.1.1.b in that the ADAS accepts data from NWS ASOS at a maximum rate of once per minute per site, plus hourly and special observations in Synoptic Aviation Observation (SAO) format.

i. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.1.2 in that the ADAS accepts data from up to a maximum of 137 sites per ADAS.

j. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.3 in that the ADAS is capable of updating ADAS database at such rates as to be able to receive 137 surface observations per minute.

In summary, the ADAS is fully compliant with the 10 weather input-related requirements. No further testing in this area is needed.

6.3 CATEGORY C DATA PROCESSING.

6.3.1 Test C1: Conclusions.

As a result of the data collection and analysis performed for test C1, the following conclusions are drawn:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.a.1 in that the ADAS flags AWOS-generated observations and issues a special (SP) when the ceiling forms or dissipates below, decreases to less than, or if below, increases to or exceeds 3000 feet.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.a.2 in that the ADAS flags AWOS-generated observations and issues a special (SP) when the ceiling forms or dissipates below, decreases to less than, or if below, increases to or exceeds 1000 feet.

c. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.a.3 in that the ADAS flags AWOS-generated observations and issues a special (SP) when the ceiling forms or dissipates below, decreases to less than, or if below, increases to or exceeds 500 feet.

d. The OT&E test data indicates that the ADAS is NOT in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.g in that the ADAS does not flag AWOS-generated observations or issue a SP when value reported for an operational runway during the preceding 10 minute decreases to or below, or if below, increases to or exceeds, 2400 feet.

e. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.e in that the ADAS flags AWOS-generated observations and issues a SP if a thunderstorm begins, increases in intensity (T to T+), or ends.

f. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.f.2 in that the ADAS flags AWOS-generated observations and issues a SP when freezing precipitation begins or ends. The condition of freezing precipitation changing in intensity was not tested as planned due to a problem with the test C1 IPS sequence file. This function will be exercised during OT&E Regression testing. This requirement is therefore partially verified.

g. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II requirement 3.2.1.5.8.2.2.6 in that the ADAS performs format conversion of AWOS messages to SAO format for hourly and special reports for dissemination to WMSCR, and that ADAS performs reasonableness checks on incoming data (time, format, etc.).

h. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.b.1 in that the ADAS flags AWOS-generated, observations and issues a special (SP) when a layer of clouds or obscuring phenomena is detected at or below 1000 feet, and such condition was not reported in the preceding observation.

i. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.b.2 in that the ADAS flags AWOS-generated observations and issues a SP when a layer of cloud or obscuring phenomena aloft is at or below the highest instrument landing minimum applicable to the airport, and such condition was not reported below this height in previous observation.

j. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.d in that the ADAS flags AWOS-generated observations and issues a SP when a change in the average wind direction of 45° or more in less than 15 minutes, and where the wind speed exceeds 6 knots.

k. The OT&E test data indicates that the ADAS is NOT in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.c.1 in that the ADAS incorrectly flags AWOS-generated observations and issues a SP when reported visibility decreases to less than, or if below, increases to or exceeds 3 miles. The message is generated but the visibility value is absent from the message contents.

l. The OT&E test data indicates that the ADAS is NOT in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.c.2 in that the ADAS incorrectly flags AWOS-generated observations and issues a SP when reported visibility decreases to less than, or if below, increases to or exceeds 2 miles. The message is generated but the visibility value is absent from the message contents.

m. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.c.3 in that the ADAS flags AWOS-generated observations and issues a SP when reported visibility decreases to less than, or if below, increases to or exceeds 1.5 miles.

n. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.c.4 in that the ADAS flags AWOS-generated observations and issues a SP when reported visibility decreases to less than, or if below, increases to or exceeds 1 mile.

o. The OT&E test data indicates that the ADAS is NOT in accordance with NAS-SS-1000, volume I, requirement 3.2.1.1.4.1.g in that the ADAS does not completely classify weather information as hazardous which may impact flight operations. This finding is a result of the ADAS NOT indicating that the RVR threshold had been crossed, and incorrectly indicating that the 2- and 3-mile visibility thresholds have been crossed (see paragraphs d, k, and l, above).

In summary, the ADAS is fully verified to be in accordance with 11 of the 15 requirements for test C1. Four requirements for test C1 were NOT met by ADAS.

6.3.2 Test C2: Conclusions.

As a result of the data collection and analysis performed for test C2, the following conclusions are drawn:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.d in that the ADAS flags AWOS-generated observations and issues a SP when a change in the average wind direction of 45° or more in less than 15 minutes, and where the wind speed exceeds 6 knots.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.h.1 in that the ADAS flags AWOS-generated observations and issues a SP when a rise in pressure at a rate exceeding 0.005" of mercury (inHg) per minute and the rise is at least 0.02 inHg.

c. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.h.2 in that the ADAS flags AWOS-generated observations and issues a SP when a rise in pressure at a rate exceeding 0.005 inHg per minute and the pressure for 20 minutes or more following the beginning of the jump remains at least 0.02 inHg higher than at the beginning.

d. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.h.3 in that the ADAS flags AWOS-generated observations and issues a SP when a rise in pressure at a rate exceeding 0.005 inHg per minute and the beginning of the jump is distinctly separated from the beginning of any preceding jump by at least 20 minutes.

In summary, the ADAS is fully verified to be in accordance with the four requirements addressed by test C2.

6.3.3 Test C3: Conclusions.

As a result of the data collection and analysis performed test C3, the following conclusions are drawn:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.f.1 in that the ADAS flags AWOS-generated observations and issues a SP when hail begins or ends.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.3.f.3 in that the ADAS flags AWOS-generated observations and issues a SP when ice pellets begin, end, or change in intensity.

c. The OT&E test data indicates that the ADAS is NOT in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.4 in that the ADAS incorrectly issues an urgent special (USP) when a tornado, water spout, or funnel cloud has been identified by a qualified observer at the AWOS operator terminal and identified in the AWOS message. The message is generated, but the word WATERSPOUT is missing when such a condition is indicated by the contents of the AWOS message.

In summary, the ADAS is fully verified to be in accordance with two of the three requirements for test C3. ADAS was fully verified to NOT be in accordance with the USP generation requirement.

6.3.4 Test C4: Conclusions.

As a result of the data collection and analysis performed test C4, the following conclusion is drawn:

The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.1.4.1.c in that the ADAS provides the capability and flexibility to support future growth and expandability.

The ADAS is fully verified to be in accordance with this requirement.

6.4 CATEGORY D DATA DISSEMINATION.

6.4.1 Test D1: Conclusions.

The conclusions derived from the data reduction and analysis of test D1 data follows:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.1.c in that the ADAS derived pressure tendencies and appended additive data every third hour indicating the pressure tendency.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.5.c in that the ADAS appended additive data every third hour starting at 0000 UTC indicating the pressure tendency for the previous 3-hour period.

c. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.1.b in that the ADAS appended additive data every hour indicating the accumulated precipitation.

d. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.1.1.1.h in that ADAS disseminates aeronautical/weather data, to users, that directly affects flight operations.

e. The test was designed to induce the generation of six specials, four indicating Pressure Unsteady, one indicating Pressure Falling Rapidly, and one indicating Pressure Rising Rapidly. The expected specials were not received, therefore, the OT&E test data indicates that the ADAS is NOT in accordance with NAS-SS-1000, Volume II, requirement 3.2.1.5.8.2.2.2.

f. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.e.4 in that ADAS processes, filters, decodes, edits, and reformats acquired data to facilitate its operational use by NAS specialists and users.

g. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.6.b in that ADAS disseminates messages current and hourly messages within 10 seconds of their reception.

6.4.2 Test D2: Conclusions.

The conclusions derived from the data reduction and analysis of test D2 data follows:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.1.1.1.h in that ADAS disseminates aeronautical/weather data, to users, that directly affects flight operations.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.b.2 and Volume II, requirement 3.2.1.5.8.2.4.a in that ADAS disseminates minute-by-minute, hourly, and specials to the RWP subsystem in AWOS format.

c. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.b.2 and Volume II, requirement 3.2.1.5.8.2.4.b in that ADAS disseminates minute-by-minute, hourly, and specials to the DLP subsystem in AWOS format.

d. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.4.c in that ADAS disseminates hourly, and special messages to the WMSCR subsystem in SAO format.

e. Whereas the WMSCR passes data received from the ADAS onto the NWS database for access by non-area specialist and users, the OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.b.4 in that ADAS disseminates hourly, and special messages to the WMSCR subsystem in SAO format.

6.4.3 Test D3: Conclusions.

The conclusions derived from the data reduction and analysis of test D3 data follows:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.e.4 in that ADAS processes, filters, decodes, edits, and reformats acquired data to facilitate its operational use by NAS specialists and users.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.4.c in that ADAS disseminates hourly, and special messages to the WMSCR subsystem in SAO format.

c. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.5.d.1 in that the ADAS appended additive data every 6 hours indicating the 6-hour accumulated precipitation for the previous 6-hour period.

d. The OT&E test data indicates that the ADAS is PARTIALLY in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.5.d.2. The 24-hour precipitation is reported as data missing, while the 1-hour precipitation value (see next paragraph) is not reset, thereby providing the 24-hour accumulation.

e. The OT&E test data indicates that the ADAS is PARTIALLY in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.5.d.3. The ADAS appears to not be resetting the 1-hour precipitation variable. In conjunction with the 24-hour accumulation missing data, it is possible that the ADAS software is improperly accessing the variable storage locations.

f. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.1.b in that the ADAS appends additive data that shows the derivation of accumulated precipitation.

6.4.4 Test D4: Conclusions.

The conclusions derived from the data reduction and analysis of test D4 data follows:

a. The OT&E test data indicates that the ADAS is PARTIALLY in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.5.a.1. Refer to subparagraph d below for the basis of this conclusion.

b. The OT&E test data indicates that the ADAS is PARTIALLY in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.5.a.2. Refer to subparagraph d below for the basis of this conclusion.

c. The OT&E test data indicates that the ADAS is PARTIALLY in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.5.b.1. Refer to subparagraph d below for the basis of this conclusion.

d. The OT&E test data indicates that the ADAS is PARTIALLY in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.5.b.2. The ADAS is only partially IAW these four NAS-SS-1000 requirements for the following reasons:

1. Above in subparagraph a, the maximum temperature for the last 12 hours is less than the minimum temperature for the last 18 hours.

2. Above in subparagraph b, the maximum temperature for the last 24 hours is less than the minimum temperature for the last 24 hours.

3. Above in subparagraph c, the maximum temperature for the previous day is reported as missing data even though data for three quarters of the previous day was provided to the ADAS.

4. Above in subparagraph c, the minimum temperature for the last 24 hours is reported as missing data even though data for three quarters of the last 24 hours was provided to the ADAS.

e. The OT&E test data indicates that the ADAS is PARTIALLY in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.5.e in that, although the ADAS generated a USP report indicating Pressure Unsteady, the hourly SA report reports Pressure Falling Rapidly.

f. The OT&E test data indicates that the ADAS is PARTIALLY in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.5.f in that, although the ADAS generated a USP report indicating Pressure Unsteady, the hourly SA report reports Pressure Falling Rapidly.

g. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.c.1 in that the ADAS appended additive data every third hour starting indicating the trend of the atmospheric pressure for the previous 3-hour period.

h. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.e.4 in that ADAS processes, filters, decodes, edits, and reformats acquired data to facilitate its operational use by NAS specialists and users.

i. The OT&E test data indicates that the ADAS is PARTIALLY in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.2.1.a. Refer to subparagraph d above for the basis of this conclusion.

6.4.5 Test D5: Conclusions.

The conclusions derived from the data reduction and analysis of test D5 data follows:

a. The marked data indicates that ADAS maintains weather trend information for the past 3 hours.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.6.a in that ADAS disseminates special messages within 5 seconds of their reception.

6.4.6 Test D6: Conclusions.

The conclusions derived from the data reduction and analysis of test D6 data follows:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.e.4 in that ADAS processes, filters, decodes, edits, and reformats acquired data to facilitate its operational use by NAS specialists and users.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.6.b in that ADAS disseminates current and hourly messages within 10 seconds of their reception.

6.4.7 Test D7: Conclusions.

The conclusions derived from the data reduction and analysis of test D7 data follows:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.e.4 in that ADAS processes, filters, decodes, edits, and reformats acquired data to facilitate its operational use by NAS specialists and users.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.6.b in that ADAS disseminates current and hourly messages within 10 seconds of their reception.

6.5 CATEGORY E DATA ARCHIVING.

6.5.1 Test E1: Conclusions.

As a result of the data collection and analysis performed test E1, the following conclusions are drawn:

a. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.1.4.1.n in that the ADAS archives weather information for use in event reconstruction and accident investigation.

b. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume I, requirement 3.2.1.2.4.g in that the ADAS, as part of the NAS, archives all weather information in accordance with section 3.2.[illegible]2.8.3 of NAS-SS-1000.

c. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.1.5 in that the ADAS archives data.

d. The OT&E test data indicates that the ADAS is in accordance with NAS-SS-1000, volume II, requirement 3.2.1.5.8.2.5 in that the ADAS archives all ADAS generated messages for a period of 15 days.

In summary, the ADAS is fully verified to be in accordance with all four archive-related requirements for test E1.

6.6 CATEGORY F ADAS RMS TO MPS INTERFACE.

6.6.1 Category F Conclusions.

The complete report for category F is contained in the "Remote Monitoring Subsystem (RMS) Functional Test of the Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) Test Report" document produced by ACN-100D. Only the high-level test objectives for category F are contained in this report.

7. RECOMMENDATIONS.

7.1 CATEGORY A FUNCTIONAL/PHYSICAL SETUP.

a. The latest proposed revision to appendix V to the Automated Weather Observation System (AWOS)/AWOS Data Acquisition System (ADAS) Interface Control document (ICD), Draft-Revision C, dated May 12, 1993, be approved.

b. The AWOS/ADAS interface be tested thoroughly with at least five AWOS stations configured on a multidrop basis.

c. The testing of the (to be installed) ADAS EIA-232 Communication Transition Module (CTM) interfaces for AWOS and Automated Surface Observing System (ASOS) circuits should be comprehensive and should include multidrop configurations in which the distance between the CTMs and their respective modems is at least 100 feet.

d. A "watchdog timer" be incorporated in each ASOS station to automatically reset, at a parametrically designated interval, the software/hardware in that station related to its ADAS link. The automatic resetting could be the equivalent of the manual resetting of the Florida ASOS stations which has been repeatedly done (with a very high frequency of success) by National Weather Service (NWS) personnel remotely from the ASOS project office in Silver Spring, MD. The "watchdog timer" could be configured to trigger the reset if, for a period slightly exceeding that of the mission cycle, the ASOS station does not either receive a weather message poll or transmit a weather message.

e. The development of the Data Link Processor (DLP) "Build 2" software be periodically monitored by ADAS project personnel to insure that this software:

1. Provides for ADAS returning in the Call Accepted packet the same 26 character Called Address Extension Field as was supplied in the Call Request packet,

2. Is compliant with the requirements of the ADAS/DLP ICD.

f. Investigation should continue into the cause(s) of failure of ASOS stations in a multidrop configuration. The GTE was responsible for the design and installation (via) MCI of the Florida (multidrop) ASOS circuit, continues to be responsible for its maintenance, and has been involved with ACW-200A in the analytical and experimental evaluation of the circuit. Thus, if at all feasible, the Florida ASOS multidrop test circuit should be continued for awhile, and advantage should be taken of the recent offer by the GTE Systems Engineering Activity to support the investigation. Concurrently, efforts should continue to install a dedicated (leased) multidrop circuit between the FAA Technical Center and the SMI Company ASOS Development Laboratory in Hunt Valley, MD, for the purpose of conducting testing between ADAS and multidropped ASOS stations at Hunt Valley.

g. Oral statements by the Weather Message Switching Center Replacement (WMSCR) test team to the effect that it is satisfactory to WMSCR if under normal circumstances ADAS and WMSCR maintain a continuous connection should be formalized by WMSCR project office memo.

h. The ADAS and WMSCR project offices should jointly resolve the issue of whether ADAS should automatically initiate a connection to the alternate WMSCR site if ADAS is unable to establish a connection to the WMSCR site with which it communicates.

i. The ADAS/WMSCR ICD should be changed to eliminate the requirement to use a transport selector indicating a nonstandard transport user.

j. The WMSCR activity should be monitored to assure that an Inactivity Timer be incorporated in WMSCR to prevent WMSCR incorrectly "hanging" in the transport layer.

7.2 CATEGORY B DATA INPUT.

7.2.1 Test B1: Recommendations.

This test addressed the capture of UTC data from a "simulated" Coded Time Source (CTS) subsystem. This test was not performed, however, since a "live" test is deemed to be more valuable in verifying test requirements. Test B2, which tests the same requirements as B1 (see below), was performed in lieu of test B1 since a "live" CTS input was available at the FAA Technical Center ADAS lab to support the ADAS Operational Test and Evaluation (OT&E) effort.

7.2.2 Test B2: Recommendations.

The ADAS was fully verified to be compliant with all CTS-related requirements. Therefore, no recommendations for test B2 are warranted.

7.2.3 Test B3: Recommendations.

Although ADAS was fully verified to be in compliance with all weather input-related requirements, the following recommendations are provided:

a. Future changes to the ADAS/AWOS ICD are expected. It is recommended that thorough regression testing be performed to ensure that all data input-related requirements remain satisfactorily met by ADAS.

b. Future ADAS Site Acceptance Testing (SAT) should emphasize maximum use of live AWOS and ASOS input to ADAS vice the portable Interactive Process Simulator (IPS). During SAT, it is important that ADAS be tested with 137 inputs, using all available live AWOS/ASOS inputs at that site, thus minimizing the number of simulated inputs needed from the IPS to make the total of 137.

c. OT&E testing could not feasibly include all varieties of weather data input to ADAS. An effort should be made during regression testing to vary the contents and sources of the AWOS and ASOS messages as much as possible.

7.3 CATEGORY C DATA PROCESSING.

7.3.1 Test C1, C2, and C3: Recommendations.

As a result of performing tests C1, C2, and C3, the following recommendations are provided regarding the ADAS weather processing-related requirements:

The requirements for ADAS to generate a special message in response RVR and Urgent Special conditions were FAILED by OT&E testing. Note: The AWOS subsystem does not, nor is it required to, implement all capabilities identified in the ADAS/AWOS ICD. Of the capabilities that the AWOS does implement, both the ADAS and the AWOS are in complete compliance. Therefore, though the ADAS is technically not in compliance with NAS-SS-1000 requirements, the ADAS is functionally compliant with the capabilities implemented in the AWOS. Therefore, even though ADAS fails to meet these NAS-SS-1000 requirements, further testing or software corrections are not recommended unless the AWOS software is modified to incorporate these functions.

Due to failure of ADAS to correctly produce special messages for some visibility conditions, correction and regression testing of this function is recommended.

Also, further testing of the ADAS function to generate other special messages is recommended due to the many possible triggers for ADAS to generate each type of message, per the AWOS/ADAS ICD. The focus of this testing should be on the generation of the following types of special messages: thunderstorm, freezing rain, and pressure. Focus should include changing intensity where applicable. The ADAS function to perform reasonableness checks should also be exercised further during regression testing.

The AWOS/ADAS ICD provides much more detail regarding the requirements of the ADAS to process various parts of the AWOS message than does the NAS-SS-1000 document. Therefore, it is recommended that a set of tests be designed and executed that focus on covering all the intricacies of special message generation, and AWOS format message conversion to Synoptic Aviation Observation (SAO) format. (With these areas being above and beyond the requirements specified in NAS-SS-1000, and tested in OT&E.)

All tests developed for this area should include test design assistance from the authors of the ADAS/AWOS ICD.

7.3.2 Test C4: Recommendations.

Although ADAS was fully verified to be compliant with the growth and expandability-related requirement, the following recommendations are provided:

The growth and expandability requirement addressed in this test can be further investigated by accurately determining the amount of spare processing power the ADAS CPU and ICCs have. This information will indicate not if the ADAS is expandable, but how much growth in processing load the existing design will afford before a hardware upgrade will be required. It is, therefore, recommended that this type of analysis and determination be performed during the conduct of regression testing.

7.4 CATEGORY D DATA DISSEMINATION.

7.4.1 Test D1: Recommendations.

The ADAS software requires extensive regression testing with respect to the generation of pressure additive data. Due to complexity of the algorithms required for the generation of pressure related additive data, it is recommended that ADAS project office have the engineers who wrote the ADAS/AWOS ICD design the regression test.

7.4.2 Test D2: Recommendations.

Whereas the ADAS performs in accordance with the NAS-SS-1000 requirements addressed by this test, there are no recommendations based on test D2.

7.4.3 Test D3: Recommendations.

The ADAS software requires extensive regression testing with respect to the generation of accumulated precipitation additive data. To ensure there are no "missing data" reports and the variable memory is properly reset, the subjective test run time should be 60 to 72 hours.

7.4.4 Test D4: Recommendations.

The ADAS software requires extensive regression testing with respect to the generation of synoptic ambient temperature additive data. To ensure there are no "missing data" reports and the variable memory is properly reset, the subjective test run time should be 60 to 72 hours.

The ADAS software requires extensive regression testing with respect to the generation of pressure additive data. Due to complexity of the algorithms required for the generation of pressure related additive data, it is recommended that ADAS project office have the engineers who wrote the ADAS/AWOS ICD design the regression test.

7.4.5 Test D5: Recommendations.

Whereas the ADAS performs in accordance with the NAS-SS-1000 requirements addressed by this test, there are no recommendations based on test D5.

7.4.6 Test D6: Recommendations.

Whereas the ADAS performs in accordance with the NAS-SS-1000 requirements addressed by this test, there are no recommendations based on test D6.

7.4.7 Test D7: Recommendations.

Whereas the ADAS performs in accordance with the NAS-SS-1000 requirements addressed by this test, there are no recommendations based on test D7.

7.5 CATEGORY E DATA ARCHIVING.

7.5.1 Test E1: Recommendations.

As a result of performing test E1, the following recommendations are provided regarding the ADAS weather processing-related requirements:

a. The ADAS provides no means of printing the contents of the SAO archive. It is recommended that this feature be added to the ADAS to provide for hardcopies of weather data when needed for accident investigation or other purposes.

b. The operation ADAS SAO archive should be spot-checked during regression testing and SAT as the amount of live AWOS/ASOS inputs connected to ADAS for testing increases over the coming months.

7.6 CATEGORY F ADAS RMS TO MPS INTERFACE.

7.6.1 Category F: Recommendations.

The complete report for category F is contained in the "Remote Monitoring Subsystem (RMS) Functional Test of the Automated Weather Observation System (AWOS) Data Acquisition System (ADAS) Test Report" document produced by ACN-100D. Only the high-level test objectives for category F are contained in this report.

8. ADAS OT&E PROBLEM TROUBLE REPORTS.

At the onset of ADAS OT&E Integration and Operational Testing, a Problem Trouble Report (PTR) database was established which included

1. The PTR format to be used,

2. Files for storing generated PTRs of various types, e.g., under evaluation, closed, transferred to another organization for evaluation, etc.,

3. A tabular summary of all PTRs including succinct description and status.

These files were accessible to all testers and enabled them to formally identify and describe all encountered deficiencies in PTRs. Additionally, each tester could (and did) use the PTR database to immediately determine any possible relationship between a problem he had uncovered and those already recorded in the database. Further, testing management, by accessing the database, was able to quickly assess the status of overall testing and of individual problems. The problems uncovered during the testing, which have been recorded in compliance with the preestablished PTR fixed format stipulated in the database, cover diverse functional, performance, and operational deficiencies in complying with the governing ICDs and the National Airspace System (NAS) and Product Specifications.

A total of 164 PTRs have been generated at the time of this report. As a result of adjudication either by individuals or by groups convened for this purpose, 69 of these PTRs have been resolved and closed, and 22 of these PTRs have been withdrawn. Of the 73 which remain open, 10 are deemed critical to commissioning.

It is planned that the tasks stipulated in the forthcoming ADAS software modification/enhancement package will address the six commissioning critical PTRs requiring a non-RMS application software change. It is felt that these PTRs are sufficiently precise to enable a straightforward correction of the problems stated.

Of the four commissioning critical PTRs which are not RMS related, one requires resolution by the ADAS and WMSCR project offices on a difference between the WMSCR/ADAS IRD and the WMSCR/ADAS ICD. One entails thorough testing (particularly with respect to permissible cable lengths) of the EIA-232 CTMs when installed, and two address the problem of the ASOS stations periodically "hanging" when in a multidrop configuration.

With respect to the other open PTRs which are not assessed as commissioning critical, none appear to necessitate a hardware modification, but rather require a (mostly straightforward) ADAS application software modification, an ICD change, or a change in operation/installation procedure documentation.

APPENDIX A

ACRONYMS AND ABBREVIATIONS

AB	Hail Beginning
ACF	Area Control Facility
ACTA MPS	Designator of MPS used for MPS/ADAS testing
ADAS	AWOS Data Acquisition System
AE	Hail Ending
AFB	Air Force Base
AOS	Automated Observing System
ARTCC	Air Route Traffic Control Center
ASC	ADAS Specialist Console
ASI	ADAS Specialist Interface
ASOS	Automated Surface Observing System
ATC	Air Traffic Control
AT&T	American Telephone and Telegraph
AWOS	Automated Weather Observation System
BER	Bit Error Rate
C	Critical
CAT	Category
CommPower	Communications and Power Engineering, Inc.
CM	Configuration Module
CPE	Communications and Power Engineering, Inc.
CPU	Central Processing Unit
CR	Connection Request
CSC	Computer Software Component
CTM	Coded Time Module
CTM	Communications Transition Module
CTS	Clear To Send
CTS	Coded Time Source
D	Demonstration
DLP	Data Link Processor
DOD	Department of Defense
DOT	Department of Transportation
DP	Data Point
DR&A	Data Reduction & Analysis
DR	Disconnect Request
DRR	Deployment Readiness Review
EPROM	Electrically Programmable Read Only Memory
EXCOM	Executive Committee
F Bit	Final Bit
FAA	Federal Aviation Administration
FAT	Factory Acceptance Test
FCA/PCA	Functional Configuration Audit/Physical Configuration Audit
FCM	Federal Coordinator for Meteorological Service
FCS	Frame Check Sequence
FD/FI	Fault Detection/Fault Isolation
FRMR	Frame Reject
HW	Hardware
I Frame	Information Frame
ICC	I/O Communications Controller
ICD	Interface Control Document
I/F	Interface

IMCS	Interim Monitor and Control Software
IML	Incoming Message Log
InHg	Conventional inches of mercury
I/O	Input/Output
I/OC	Input/Output Controller
IPB	Ice Pellets Begin
IPS	Interactive Process Simulator
IRD	Interface Requirements Document
ISC	IPS Specialist Console
ISI	IPS Specialist Interface
ISO/OSI	International Standards Organization/Standard for Open System Interface
ITC	Integration Test Configuration
ITP	Integration Test Plan
ITPR	Integration Test Procedures
LCN	Local Communications Network
LMPA	Line Monitor Protocol Analyzer
MAP	Maintenance Automation Program
MD	Maryland
MPS	Maintenance Processor Subsystem
NADIN	NAS Data Interchange Network
NADIN II	NAS Data Interchange Network II
NAS	National Airspace System
NAWPF	National Aviation Weather Processing Facility
NC	Non-Critical
N(R)	Transmitter Receive Sequence Number
N(S)	Transmitter Send Sequence Number
NWS	National Weather Service
NWSTG	NWS Telecommunications Gateway
OML	Outgoing Message Log
OT&E	Operational Test and Evaluation
P Bit	Poll Bit
PA	Protocol Analyzer
PO	Project Office
PSF	Program Support Facility
PSN	Packet Switched Network
RMMS	Remote Maintenance Monitoring System
RMS	Remote Monitoring Subsystem
RR	Receive Ready
RS	Synoptic Aviation Record Special
RTN	Return
RTN	Return to Normal
RTS	Ready to Send
RVR	Runway Visual Range
RWP	Real-Time Weather Processor
SA	Synoptic Aviation Report
SAO	Synoptic Aviation Observation
SBC	Single Board Computer
SD1	System Design Problem 1

SD2	System Design Problem 2
SD3	System Design Problem 3
SFO	Sector Field Office
SI	Specialist Interface
SNRM	Set Normal Response Mode
SP	Special Report
SSF	System Support Facility
T	Test
T&E	Test and Evaluation
TA	Test Message
TP4	Transport Protocol Class 4
TSAP-ID	Transport Service Access Point Identifier (Address)
TVRTM	Test Verification Requirements Traceability Matrix
UA	Unnumbered Acknowledgement (Response Frame)
USP	Urgent Special Report
UTC	Coordinated Universal Time
VM	Verification Method
VNTSC	Volpe National Transportation Safety Center
WMSCR	Weather Message Switching Center Replacement

APPENDIX B

TEST VERIFICATION REQUIREMENTS TRACEABILITY MATRIX

B. TEST VERIFICATION REQUIREMENTS TRACEABILITY MATRIX.

The ADAS OT&E Integration TVRTM contained herein provides the following information:

TABLE B-1. ADAS OT&E TVRTM: REQUIREMENT ENTRY DESCRIPTIONS

TVRTM Entry Header	Description of ADAS OT&E TVRTM Entry
Req Vol.	Requirement's NAS-SS-1000 Volume Number
Paragraph #	Requirement's NAS-SS-1000 Paragraph Number
Requirement Description	Description of OT&E Integration Requirement
Req CAT	Requirement's OT&E Integration Category
Req VM	Requirement's Verification Method
Req Cfg	Requirement's OT&E Test Bed Configuration
Req Ver'd	Indicates whether or not the Requirement has been verified
IAW Reqm't	Indicates level of compliance with the requirement (i.e. Fully, Par'l {Partially}, or NOT)
Test Report Paragraph #	Test Report Paragraph which presents requirement verification conclusions

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS

Vol.	Paragraph Number:	Requirement Description
I:	3.2.1.1.1.1.h	Disseminate aeronautical/weather data to the user that directly affects flight operations;
I:	3.2.1.1.4.1.a	Accept weather information from external subsystems that support NAS specialists and users;
I:	3.2.1.1.4.1.b	Collect and/or sense weather information that pertains to the area of NAS responsibility for terminal and en route operations;
I:	3.2.1.1.4.1.c	Provide the capability and flexibility to support future growth and expandability;

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
I:	3.2.1.1.4.1.e	Accept input from specialists including annotations or remarks to existing weather information or commands to generate specific weather products;
I:	3.2.1.1.4.1.g	Classify weather information as hazardous which may impact flight operations;
I:	3.2.1.1.4.1.n	Archive weather information for use in event reconstruction and accident investigation;
I:	3.2.1.1.9.1.a	The NAS shall continually monitor subsystem performance to obtain the data needed by specialist for maintenance and operations support;
I:	3.2.1.1.9.1.b	The NAS shall provide the status of subsystems to specialists and shall generate an alarm upon the deviation of designated parameters from prescribed limits;
I:	3.2.1.1.9.1.g	The NAS shall provide the specialist access to the monitoring, control, and data management capabilities of the NAS as required and as authorized by administrative directive;
I:	3.2.1.2.4.a.4.d	Collect NWS generated current weather observations, at least once every minute;
I:	3.2.1.2.4.a.5	Collect DOD generated data on current surface weather observations at least once every minute;
I:	3.2.1.2.4.b.2	Current weather observation information shall be available to local area specialists and users and updates at least once per minute;
I:	3.2.1.2.4.b.4	Current surface weather observation information shall be available to non-local area specialists and users and updated at least once per hour;
I:	3.2.1.2.4.c.1	The NAS shall maintain trend weather information for the past 3 hours;
I:	3.2.1.2.4.e.4	NAS shall perform all processing required to produce &/or complete a desc. of current/trend/or predicted weather conditions by filtering, decoding, editing, and reformatting acquired weather data to facilitate its operational use by NAS specialists and users;

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
I:	3.2.1.2.4.g	The NAS shall archive all weather information in accordance with section 3.2.1.2.8.3;
I:	3.2.1.2.8.4.b	ADAS shall be synchronized to within 6 seconds of UTC;
I:	3.2.1.2.8.4.c	ADAS shall provide interfacing capabilities to the coded time signal and synchronization in accordance with Vol.s II through V of NAS-SS-1000;
I:	3.2.1.2.9.a	The NAS shall provide the capability to continually monitor the status, alarms/alerts and performance data of selected subsystems;
I:	3.2.3.1	Fault Detection/Fault Isolation (FD/FI) program i.a.w. (in accordance with) MIL-STD-2165, detecting all faults and isolating them to the correct LRU 95% of the time.
I:	3.3.1	Parts, material, and Processes (PMP) control standardization program i.a.w. the requirements of FAA-G-2100.
I:	3.3.6.1-a	No subsystem or interfacing subsystem shall degrade operational safety or increase risk;
I:	3.3.6.1-b	Compliance shall be verified by safety analysis conducted i.a.w. MIL-STD-882 structured as appropriate to provide safety standards for each program.
I:	3.3.6.2	NAS facilities and facility subsystems shall comply with Code of Federal Regulations, Title 29.
I:	3.3.7	ADAS shall establish a human engineering program i.a.w. MIL-H-46855, to assure compliance with the requirements of MIL-STD-1472.
I:	3.5.1	Maintenance of ADAS shall comply with the NAILS Master Plan and FAA Order 6000.30.
I:	3.6.1	NAS shall provide trained personnel to operate and maintain the ADAS.

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
I:	3.6.2	NAS shall provide training equipment and facilities for accomplishing operator and technician training in the evolving NAS environment.
I:	30.1.1.1.H	The ADAS shall provide for the monitoring of designated subsystems performance parameters.
I:	30.1.1.2.H	The ADAS shall provide subsystem operating status data including configuration and mode of operation.
I:	30.1.1.3.H	The ADAS shall provide subsystem status reports that contain only state changes and alarms/alerts in response to a subsystem status request.
I:	30.1.1.4.H	The ADAS shall automatically provide for the accumulation of current subsystem status and performance data in a local datafile.
I:	30.1.1.5.H	The ADAS shall provide subsystem data in response to requests from RMMS subsystems.
I:	30.1.1.6.H	The ADAS shall provide an alarm when any designated NAS subsystem monitored parameter is out of tolerance.
I:	30.1.1.9.H	The ADAS shall provide a Return-To-Normal alarm when an initial alarm condition is cleared.
I:	30.1.1.10.H	The ADAS shall provide an alert when selected subsystem parameters are outside a predetermined range.
I:	30.1.1.11.H	The ADAS shall provide the capability to set or change ranges for subsystem alarm or alert parameters.
I:	30.1.1.12.H	The ADAS shall provide for the disabling of a subsystem alarm or alert by a specialist on-site.
I:	30.1.1.13.H	The ADAS shall report the disabling of a subsystem alarm or alert as performance data.
I:	30.1.1.15.H	The ADAS shall provide subsystem diagnostic data in response to a diagnostic test request.

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
II:	3.2.1.5.8.1.1	Collect data from federal, non-federal, and DOD AWOS and NWS ASOS.
II:	3.2.1.5.8.1.3	Maintain an adaptive data base containing such info as site location (long., lat.), site identifiers, etc. for each AWOS/ASOS assign to it. Maintain parameters and characteristics for processors interfacing with the ADAS.
II:	3.2.1.5.8.1.5	The ADAS shall archive data.
II:	3.2.1.5.8.1.7	Receive and maintain system timing synchronized to UTC to support archiving, database maintenance, and dissemination.
II:	3.2.1.5.8.2.1.1.a	Accept data from Federal, non-Federal and DOD AWOS at a maximum rate of once per minute per site.
II:	3.2.1.5.8.2.1.1.b	Accept data from NWS ASOS at a maximum rate of once per minute per site, plus hourly and special observations in SAO format.
II:	3.2.1.5.8.2.1.2	Accept data from up to a maximum of 137 sites per ADAS.
II:	3.2.1.5.8.2.2.1.a	Derive Minimum/Maximum temperatures over an adaptive period.
II:	3.2.1.5.8.2.2.1.b	Derive precipitation accumulation over adaptive periods.
II:	3.2.1.5.8.2.2.1.c	Derive pressure tendencies.
II:	3.2.1.5.8.2.2.2	Derive additive data remarks for pressure rising/falling rapidly, and pressure unsteady.
II:	3.2.1.5.8.2.2.3.a.1	Flag AWOS generated observations and issue a special (SP) when the ceiling forms or dissipates below, decreases to less than, or if below, increases to or exceeds 3000 feet.
II:	3.2.1.5.8.2.2.3.a.2	Flag AWOS generated observations and issue a special (SP) when the ceiling forms or dissipates below, decreases to less than, or if below, increases to or exceeds 1000 feet.

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
II:	3.2.1.5.8.2.2.3.a.3	Flag AWOS generated observations and issue a special (SP) when the ceiling forms or dissipates below, decreases to less than, or if below, increases to or exceeds 500 feet.
II:	3.2.1.5.8.2.2.3.b.1	Flag AWOS generated observations and issue a special (SP) when a layer of clouds or obscuring phenomena is detected at or below 1000 feet, and such condition was not reported in the preceding observation;
II:	3.2.1.5.8.2.2.3.b.2	Flag AWOS generated observations & issue a SP when a layer of cloud or obscuring phenomena aloft is at or below the highest instrument landing min.s applicable to the airport, & such condition was not reported below this height in previous observation.
II:	3.2.1.5.8.2.2.3.c.1	Flag AWOS generated observations & issue a special when reported visibility decreases to less than, or if below, in creases to or exceeds 3 miles.
II:	3.2.1.5.8.2.2.3.c.2	Flag AWOS generated observations & issue a SP when reported visibility decreases to less than, or if below, increases to or exceeds 2 miles;
II:	3.2.1.5.8.2.2.3.c.3	Flag AWOS generated observations & issue a SP when reported visibility decreases to less than, or if below, increases to or exceeds 1.5 miles;
II:	3.2.1.5.8.2.2.3.c.4	Flag AWOS generated observations & issue a SP when reported visibility decreases to less than, or if below, increases to or exceeds 1 mile;
II:	3.2.1.5.8.2.2.3.d	Flag AWOS generated observations & issue a SP when a change in the avg. wind direction of 45 degrees or more in less than 15 minutes, & where the wind speed exceeds 6 knots.
II:	3.2.1.5.8.2.2.3.e	Flag AWOS generated observations & issue a SP if a thunderstorm begins, increases in intensity (T to T+), or ends.
II:	3.2.1.5.8.2.2.3.f.1	Flag AWOS generated observations & issue a SP when Hail begins or ends.

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
II:	3.2.1.5.8.2.2.3.f.2	Flag AWOS generated observations & issue a SP when freezing precipitation begins, ends, or changes in intensity;
II:	3.2.1.5.8.2.2.3.f.3	Flag AWOS generated observations & issue a SP when Ice Pellets begin, end, or change in intensity.
II:	3.2.1.5.8.2.2.3.g	Flag AWOS generated observations & issue a SP when value reported for an operational runway during the preceding 10 min. decreases to or below, or if below, increases to or exceeds, 2400 feet.
II:	3.2.1.5.8.2.2.3.h.1	Flag AWOS generated observations & issue a SP when a rise in pressure at a rate exceeding 0.005" of mercury (inHg) per minute and the rise is at least 0.02 inHg;
II:	3.2.1.5.8.2.2.3.h.2	Flag AWOS generated observations & issue a SP when a rise in pressure at a rate exceeding 0.005 inHg per minute and the pressure for 20 min.s or more following the beginning of the jump remains at least 0.02 inHg higher than at the beginning;
II:	3.2.1.5.8.2.2.3.h.3	Flag AWOS generated observations & issue a SP when a rise in pressure at a rate exceeding 0.005 inHg per minute and the beginning of the jump is distinctly separated from the beginning of any preceding jump by at least 20 minutes.
II:	3.2.1.5.8.2.2.4	Issue an urgent special (USP) when a tornado, water spout, or funnel cloud has been identified by a qualified observer at the AWOS operator terminal, and identified in the AWOS message.
II:	3.2.1.5.8.2.2.5.a.1	Generate hourly reports at an adaptive time.Append the additive data groups and report to the hourly messages: Maximum Temperature for the last 12 hours at 0000 UTC;
II:	3.2.1.5.8.2.2.5.a.2	Generate hourly reports at an adaptive time. Append the additive data groups and reports to the hourly messages: Maximum temperature for the last 24 hours at 0600 UTC.

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
II:	3.2.1.5.8.2.2.5.b.1	Generate hourly reports at an adaptive time. Append the additive data groups & reports to the hourly messages: Minimum temperature for the last 12 hours at 1200 UTC;
II:	3.2.1.5.8.2.2.5.b.2	Generate hourly reports at an adaptive time. Append the additive data groups & reports to the hourly messages: Minimum temperature for the last 24 hours at 1800 UTC.
II:	3.2.1.5.8.2.2.5.c	Generate hourly reports at an adaptive time. Append additive data groups & reports to the hourly messages: Pressure tendency report every 3 hours beginning at 0000 utc, for the past 3 hours.
II:	3.2.1.5.8.2.2.5.d.1	Generate hourly reports at an adaptive time. Append the additive data groups & reports to the hourly messages: 6 hour precipitation accumulation every 6 hours beginning at 0000 UTC;
II:	3.2.1.5.8.2.2.5.d.2	Generate hourly reports at an adaptive time. Append the additive data groups & reports to the hourly messages: 24 hour precipitation accumulation reported at 1200 UTC;
II:	3.2.1.5.8.2.2.5.d.3	Generate hourly reports at an adaptive time. Append the additive data groups & reports to the hourly messages: 1 hour precipitation accumulation reported hourly.
II:	3.2.1.5.8.2.2.5.e	Generate hourly reports at an adaptive time. Append the additive data & reports to the hourly messages: Pressure Unsteady, reported hourly if pressure varies by 0.03 inches from the mean trend.
II:	3.2.1.5.8.2.2.5.f	Generate hourly reports at an adaptive time. Append the additive data groups & reports to the hourly messages: Pressure Rising/Falling Rapidly report hourly when pressure rises/falls at a rate of 0.06 in/hr or more with a total rise/fall of 0.02 in.
II:	3.2.1.5.8.2.2.6	Perform format conversion of AWOS messages to SAO format for hourly and special reports for dissemination to WMSCR. Perform reasonableness checks on incoming data (time, format, etc.).

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
II:	3.2.1.5.8.2.3	Be capable of updating ADAS data base at such rates as to be able to receive 137 surface observations per minute.
II:	3.2.1.5.8.2.4.a	Disseminate surface observations to the RWP subsystem, minute-by-minute, hourlies, and all specials in AWOS format.
II:	3.2.1.5.8.2.4.b	Disseminate surface observations to the WCP (DLP) subsystem, minute-by-minute, hourlies, and all specials, in AWOS format.
II:	3.2.1.5.8.2.4.c	Disseminate surface observations to the WMSCR subsystem, hourlies, and specials, in SAO format.
II:	3.2.1.5.8.2.5	Archive all ADAS generated messages for a period of 15 days.
II:	3.2.1.5.8.2.6.a	Disseminate specials within 5 seconds of receipt of data.
II:	3.2.1.5.8.2.6.b	Disseminate current/hourlies within 10 second of receipt of data.
II:	3.2.1.5.8.2.7	The ADAS shall generate and transmit maintenance data in accordance with response times specified in 3.2.1.1.4.2.1, 3.2.1.1.4.2.2, 3.2.1.1.4.2.3, and 3.2.1.1.4.2.7 in Volume V of NAS-SS-1000.
II:	3.2.1.5.8.2.8	Synchronize to the NAS standard time reference in accordance with section 3.2.1.2.8.4 in vol. I of NAS-SS-1000. Be capable of 1 second timing resolution.
II:	3.2.1.5.8.3-1.A	ADAS shall interface functionally and physically with the CTS as shown in figure 3.2.1.5.8.3-1. The functional interfaces are defined in Table 3.2.1.5.8.3-1.
II:	3.2.1.5.8.3-1.B	ADAS shall interface functionally and physically with AWOS/ASOS as shown in figure 3.2.1.5.8.3-1. The functional interfaces are defined in Table 3.2.1.5.8.3-1.

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
II:	3.2.1.5.8.3-1.C	ADAS shall interface functionally and physically with the WCP (DLP) as shown in figure 3.2.1.5.8.3-1. The functional interfaces are defined in Table 3.2.1.5.8.3-1.
II:	3.2.1.5.8.3-1.D	ADAS shall interface functionally and physically with the DOD AWOS as shown in figure 3.2.1.5.8.3-1. The functional interfaces are defined in Table 3.2.1.5.8.3-1.
II:	3.2.1.5.8.3-1.E	ADAS shall interface functionally and physically with the MPS as shown in figure 3.2.1.5.8.3-1. The functional interfaces are defined in Table 3.2.1.5.8.3-1.
II:	3.2.1.5.8.3-1.F	ADAS shall interface functionally and physically with the MPS as shown in figure 3.2.1.5.8.3-1. The functional interfaces are defined in Table 3.2.1.5.8.3-1.
II:	3.2.1.5.8.3-1.G	ADAS shall interface functionally and physically with the NFED AWOS as shown in figure 3.2.1.5.8.3-1. The functional interfaces are defined in Table 3.2.1.5.8.3-1.
II:	3.2.1.5.8.3-1.H	ADAS shall interface functionally and physically with the RWP as shown in figure 3.2.1.5.8.3-1. The functional interfaces are defined in Table 3.2.1.5.8.3-1.
II:	3.2.1.5.8.3-1.I	ADAS shall interface functionally and physically with the WMSCR as shown in figure 3.2.1.5.8.3-1. The functional interfaces are defined in Table 3.2.1.5.8.3-1.
V:	3.2.1.1.2.2.4	The RMMS shall detect and present alarms & state changes from all designated NAS subsystems to NAS specialist within an average time of 10 seconds and a maximum time of 60 seconds, measured from time of detection to time of presentation.
V:	3.2.1.1.4.1.1	The RMS shall obtain subsystem status and performance data from the subsystem as determined in adaptation and in accordance with the reqm'ts in this section.

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
V:	3.2.1.1.4.1.2	The RMS shall monitor subsystem performance in real time by use of on-line (hardware sensors) and/or in-line (software sensors) monitors.
V:	3.2.1.1.4.1.3	The RMS shall automatically accumulate current status and performance data in a local data file.
V:	3.2.1.1.4.1.4	The RMS shall provide data in response to a request from other RMMS subsystems.
V:	3.2.1.1.4.1.5	The RMS shall obtain operation status data from the subsystem that includes configuration and mode of operation.
V:	3.2.1.1.4.1.6	The RMS status report shall contain only state changes and alarms/alerts in response to a subsystem status request.
V:	3.2.1.1.4.1.7	The RMS shall generate an alarm when any designated NAS subsystem monitored parameter is out of tolerance.
V:	3.2.1.1.4.1.9	The RMS shall generate a return-to-normal alarm when an initial alarm condition is cleared.
V:	3.2.1.1.4.1.10	The RMS shall generate an alert when selected parameter measurements are outside a predetermined range.
V:	3.2.1.1.4.1.11	The RMS shall have the capability to accept a predetermined range for alarm and alert parameters.
V:	3.2.1.1.4.1.12	The RMS shall provide for the disabling of an alarm or alert by a specialist on-site. This action shall only inhibit alarms or alerts generated by the specific subsystem.
V:	3.2.1.1.4.1.13	The RMS shall report the disabling of an alarm or alert as performance data.
V:	3.2.1.1.4.2.1	The RMS shall detect an alarm/alert condition, filter extraneous fluctuations, and provide an indication to the local status file within an average time of 2 seconds and a maximum time of 10 seconds.

TABLE B-2. ADAS OT&E TVRTM: REQUIREMENT DESCRIPTIONS (Continued)

Vol.	Paragraph Number:	Requirement Description
V:	3.2.1.1.4.2.2	The RMS shall detect a change of state, filter extraneous fluctuations, and provide an indication to the local status file within an average time of 2 seconds and a maximum time of 10 seconds.
V:	3.2.1.1.4.2.3	The RMS shall collect the certification test data, diagnostic test data, monitored parameter data, or facility data for a single report within an average time of 50 sec and a maximum time of 4 min. The data shall be available in the local status file.
V:	3.2.1.1.4.2.7	The RMS shall provide indication of status for all subsystem operating modes that is derived from subsystem performance monitors.
V:	3.2.1.1.4.2.8	The RMS shall transfer to the RMSC/MPS on a priority basis with the order of priority being status messages, message data, and performance data.
V:	3.2.1.1.4.3	For RMS functional/physical interfaces, refer to appropriate subsystems in Volumes II through IV of NAS-SS-1000.

TABLE B-3. ADAS OT&E TVRTM: REQUIREMENT CHARACTERISTICS

Req Vol.	Requirement Paragraph #:	Req CAT	Req VM	Req Cfg	Req Ver'd	IAW Reqm't	Test Report Paragraph #
I:	3.2.1.1.1.1.h	D	D	1	Yes	Fully	6.4.1-d, 6.4.2-a
I:	3.2.1.1.4.1.a	B	D	2	Yes	Fully	6.2.2-a
I:	3.2.1.1.4.1.b	B	D	2	Yes	Fully	6.2.2-b
I:	3.2.1.1.4.1.c	C	D	1	Yes	Fully	6.3.3-a
I:	3.2.1.1.4.1.e	B	D	2	Yes	Fully	6.2.2-c
I:	3.2.1.1.4.1.g	C	D	1	Yes	NOT	6.3.1-o
I:	3.2.1.1.4.1.n	E	D	1	Yes	Fully	6.5.1-a

TABLE B-3. ADAS OT&E TVRTM: REQUIREMENT CHARACTERISTICS (Continued)

Req Vol.	Requirement Paragraph #:	Req CAT	Req VM	Req Cfg	Req Ver'd	IAW Reqm't	Test Report Paragraph #
I:	3.2.1.1.9.1.a	F	D	5	See ACN-100D Test Report		
I:	3.2.1.1.9.1.b	F	D	5	See ACN-100D Test Report		
I:	3.2.1.1.9.1.g	F	D	5	See ACN-100D Test Report		
I:	3.2.1.2.4.a.4.d	B	T	2	Yes	Fully	6.2.2-d
I:	3.2.1.2.4.a.5	B	T	2	Yes	Fully	6.2.2-e
I:	3.2.1.2.4.b.2	D	D,T	1	Yes	Fully	6.4.2-b, 6.4.2-c
I:	3.2.1.2.4.b.4	D	D,T	1	Yes	Fully	6.4.2-e
I:	3.2.1.2.4.c.1	D	D,T	1	Yes	Fully	6.4.4-g
I:	3.2.1.2.4.e.4	D	D	1	Yes	Fully	6.4.1-f, 6.4.3-a, 6.4.4-h, 6.4.6-a, 6.4.7-a
I:	3.2.1.2.4.g	E	T	1	Yes	Fully	6.5.1-b
I:	3.2.1.2.8.4.b	B	T	1,7	Yes	Fully	6.2.1-a
I:	3.2.1.2.8.4.c	B	T	1,7	Yes	Fully	6.2.1-b
I:	3.2.1.2.9.a	F	T	3	See ACN-100D Test Report		
I:	3.2.3.1	A	A,I	2	Yes	Fully	6.1-k
I:	3.3.1	A	I	2	Yes	Fully	6.1-k
I:	3.3.6.1-a	A	A	2	Yes	Fully	6.1-k
I:	3.3.6.1-b	A	I	2	Yes	Fully	6.1-k
I:	3.3.6.2	A	I	2	Yes	Fully	6.1-k
I:	3.3.7	A	I	2	Yes	Fully	6.1-k
I:	3.5.1	A	I	2	Yes	Fully	6.1-k

TABLE B-3. ADAS OT&E TVRTM: REQUIREMENT CHARACTERISTICS (Continued)

Req Vol.	Requirement Paragraph #:	Req CAT	Req VM	Req Cfg	Req Ver'd	IAW Reqm't	Test Report Paragraph #
I:	3.6.1	A	I	2	Yes	Fully	6.1-k
I:	3.6.2	A	I	2	Yes	Fully	6.1-k
I:	30.1.1.1.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.2.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.3.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.4.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.5.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.6.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.9.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.10.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.11.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.12.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.13.H	F	D	3	See ACN-100D Test Report		
I:	30.1.1.15.H	F	D	3	See ACN-100D Test Report		
II:	3.2.1.5.8.1.1	B	D	2	Yes	Fully	6.2.2-f
II:	3.2.1.5.8.1.3	F	D	1	See ACN-100D Test Report		
II:	3.2.1.5.8.1.5	E	D	1	Yes	Fully	6.5.1-c
II:	3.2.1.5.8.1.7	B	T	1,7	Yes	Fully	6.2.1-c
II:	3.2.1.5.8.2.1.1.a	B	T	2	Yes	Fully	6.2.2-g
II:	3.2.1.5.8.2.1.1.b	B	T	2	Yes	Fully	6.2.2-h
II:	3.2.1.5.8.2.1.2	B	T	1,2,5	Yes	Fully	6.2.2-i

TABLE B-3. ADAS OT&E TVRTM: REQUIREMENT CHARACTERISTICS (Continued)

Req Vol.	Requirement Paragraph #:	Req CAT	Req VM	Req Cfg	Req Ver'd	IAW Reqm't	Test Report Paragraph #
II:	3.2.1.5.8.2.2.1.a	D	T	1	Yes	Fully	6.4.4-i
II:	3.2.1.5.8.2.2.1.b	D	D	1	Yes	Fully	6.4.1-c, 6.4.3-f
II:	3.2.1.5.8.2.2.1.c	D	D	1	Yes	Fully	6.4.1-a
II:	3.2.1.5.8.2.2.2	D	D	1	Yes	NOT	6.4.1-e
II:	3.2.1.5.8.2.2.3.a.1	C	T	1	Yes	Fully	6.3.1-a
II:	3.2.1.5.8.2.2.3.a.2	C	T	1	Yes	Fully	6.3.1-b
II:	3.2.1.5.8.2.2.3.a.3	C	T	1	Yes	Fully	6.3.1-c
II:	3.2.1.5.8.2.2.3.b.1	C	T	1	Yes	Fully	6.3.1-h
II:	3.2.1.5.8.2.2.3.b.2	C	T	1	Yes	Fully	6.3.1-i
II:	3.2.1.5.8.2.2.3.c.1	C	T	1	Yes	Fully	6.3.1-k
II:	3.2.1.5.8.2.2.3.c.2	C	T	1	Yes	Fully	6.3.1-l
II:	3.2.1.5.8.2.2.3.c.3	C	T	1	Yes	Fully	6.3.1-m
II:	3.2.1.5.8.2.2.3.c.4	C	T	1	Yes	Fully	6.3.1-n
II:	3.2.1.5.8.2.2.3.d	C	D	1	Yes	Fully	6.3.2-a, 6.3.1.j
II:	3.2.1.5.8.2.2.3.e	C	D	1	Yes	Fully	6.3.1-e
II:	3.2.1.5.8.2.2.3.f.1	C	D	1	Yes	Fully	6.3.3-a
II:	3.2.1.5.8.2.2.3.f.2	C	D	1	Yes	Par'l	6.3.1-f
II:	3.2.1.5.8.2.2.3.f.3	C	D	1	Yes	Fully	6.3.3-b
II:	3.2.1.5.8.2.2.3.g	C	T	1	Yes	NOT	6.3.1-d
II:	3.2.1.5.8.2.2.3.h.1	C	T	1	Yes	Fully	6.3.2-b
II:	3.2.1.5.8.2.2.3.h.2	C	T	1	Yes	NOT	6.3.2-c

TABLE B-3. ADAS OT&E TVRTM: REQUIREMENT CHARACTERISTICS (Continued)

Req Vol.	Requirement Paragraph #:	Req CAT	Req VM	Req Cfg	Req Ver'd	IAW Reqm't	Test Report Paragraph #
II:	3.2.1.5.8.2.2.3.h.3	C	T	1	Yes	Fully	6.3.2-d
II:	3.2.1.5.8.2.2.4	C	D	1	Yes	Fully	6.3.3-c
II:	3.2.1.5.8.2.2.5.a.1	D	T	1,5	Yes	Par'l	6.4.4-a
II:	3.2.1.5.8.2.2.5.a.2	D	T	1,5	Yes	Par'l	6.4.4-b
II:	3.2.1.5.8.2.2.5.b.1	D	T	1,5	Yes	Par'l	6.4.4-c
II:	3.2.1.5.8.2.2.5.b.2	D	T	1,5	Yes	Par'l	6.4.4.d
II:	3.2.1.5.8.2.2.5.c	D	T	1,5	Yes	Fully	6.4.1-b
II:	3.2.1.5.8.2.2.5.d.1	D	T	1,5	Yes	Fully	6.4.3-c
II:	3.2.1.5.8.2.2.5.d.2	D	T	1,5	Yes	Par'l	6.4.3-d
II:	3.2.1.5.8.2.2.5.d.3	D	T	1,5	Yes	Par'l	6.4.3-e
II:	3.2.1.5.8.2.2.5.e	D	T	1,5	Yes	Par'l	6.4.4-e
II:	3.2.1.5.8.2.2.5.f	D	T	1,5	Yes	Par'l	6.4.4-f
II:	3.2.1.5.8.2.2.6	C	D	1	Yes	Fully	6.3.1-g
II:	3.2.1.5.8.2.3	B	T	2,5	Yes	Fully	6.2.2-j
II:	3.2.1.5.8.2.4.a	D	T	1,5,6	Yes	Fully	6.4.2-b
II:	3.2.1.5.8.2.4.b	D	T	1,5,6	Yes	Fully	6.4.2-c
II:	3.2.1.5.8.2.4.c	D	T	1,5,6	Yes	Fully	6.4.2-d, 6.4.3-b
II:	3.2.1.5.8.2.5	E	T	1	Yes	Fully	6.5.1-d
II:	3.2.1.5.8.2.6.a	D	T	1	Yes	Fully	6.4.5-b
II:	3.2.1.5.8.2.6.b	D	T	1	Yes	Fully	6.4.1-g, 6.4.6-b, 6.4.7-b

TABLE B-3. ADAS OT&E TVRTM: REQUIREMENT CHARACTERISTICS (Continued)

Req Vol.	Requirement Paragraph #:	Req CAT	Req VM	Req Cfg	Req Ver'd	IAW Reqm't	Test Report Paragraph #
II:	3.2.1.5.8.2.7	F	T	3	See ACN-100D Test Report		
II:	3.2.1.5.8.2.8	B	T	1,7	Yes	Fully	6.2.1-d
II:	3.2.1.5.8.3-1.A	A	D	5	Yes	Fully	6.1-j
II:	3.2.1.5.8.3-1.B	A	D	2	Yes	Fully	6.1-a
II:	3.2.1.5.8.3-1.C	A	D	5,6	Yes	Fully	6.1-c-2
II:	3.2.1.5.8.3-1.D	A	D	2	Yes	Fully	6.1-a, 6.1-b
II:	3.2.1.5.8.3-1.E	F	D	5,6	See ACN-100D Test Report, 6.1-c-1		
II:	3.2.1.5.8.3-1.F	F	D	5,6	See ACN-100D Test Report, 6.1-c-1		
II:	3.2.1.5.8.3-1.G	A	D	2	Yes	Fully	6.1-b
II:	3.2.1.5.8.3-1.H	A	D	5,6	No	N/A	N/A
II:	3.2.1.5.8.3-1.I	A	D	5,6	Yes	Fully	6.1-c-1
V:	3.2.1.1.2.2.4	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.1	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.2	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.3	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.4	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.5	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.6	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.7	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.9	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.10	F	T	3	See ACN-100D Test Report		

TABLE B-3. ADAS OT&E TVRTM: REQUIREMENT CHARACTERISTICS (Continued)

Req Vol.	Requirement Paragraph #:	Req CAT	Req VM	Req Cfg	Req Ver'd	IAW Reqm't	Test Report Paragraph #
V:	3.2.1.1.4.1.11	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.12	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.1.13	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.2.1	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.2.2	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.2.3	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.2.7	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.2.8	F	T	3	See ACN-100D Test Report		
V:	3.2.1.1.4.3	F	T	3	See ACN-100D Test Report		

APPENDIX C

ADAS OT&E TEST BED CONFIGURATIONS

C. ADAS OT&E TEST BED CONFIGURATIONS.

This appendix contains diagrams of the physical configurations of the ADAS OT&E Test Bed. Table B-1 lists the components of each Integration Test Configuration (ITC).

TABLE C-1. TEST BED COMPONENT CROSS-REFERENCE MATRIX

Config	CTS	MPS	RWP	DLP	WMSCR	NADIN	LCN	AWOSs	Testcom
1	S	S	S	S	S	S	S	S	No
2	S	S	S	S	S	S	S	L/S	No
3	S	S	S	S	S	S	S	S	Yes
4	S	S	S	L	S	S	S	S	Yes
5	L	L	L	L	L	L	-	L/S	No
6	L	L	L	L	L	L	L	L/S	No
7	L	S	S	S	S	S	S	S	No
8	L	S	S	S	S	S	S	S	No
9	L	-	-	L	-	L	-	L/S	No
10	L	L	-	-	-	L	-	L/S	Yes
11	L	-	-	-	L	L	-	L/S	No
12	L	L	-	-	L	L	-	L/S	Yes

Note: L - Live S - Simulated L/S - Live and Simulated

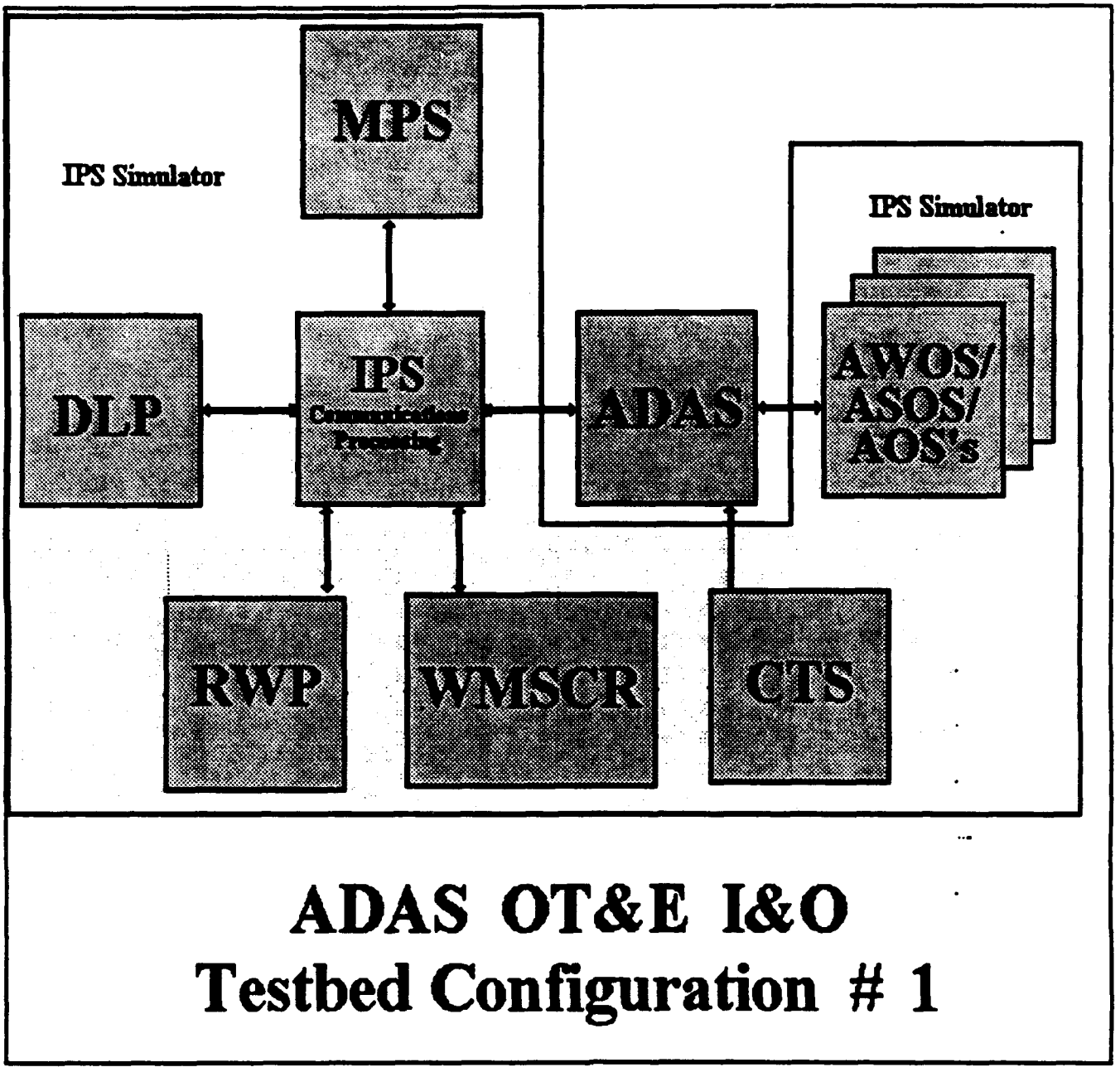

FIGURE C-1. ADAS OT&E TESTBED CONFIGURATION 1 (ADAS_ITC_1)

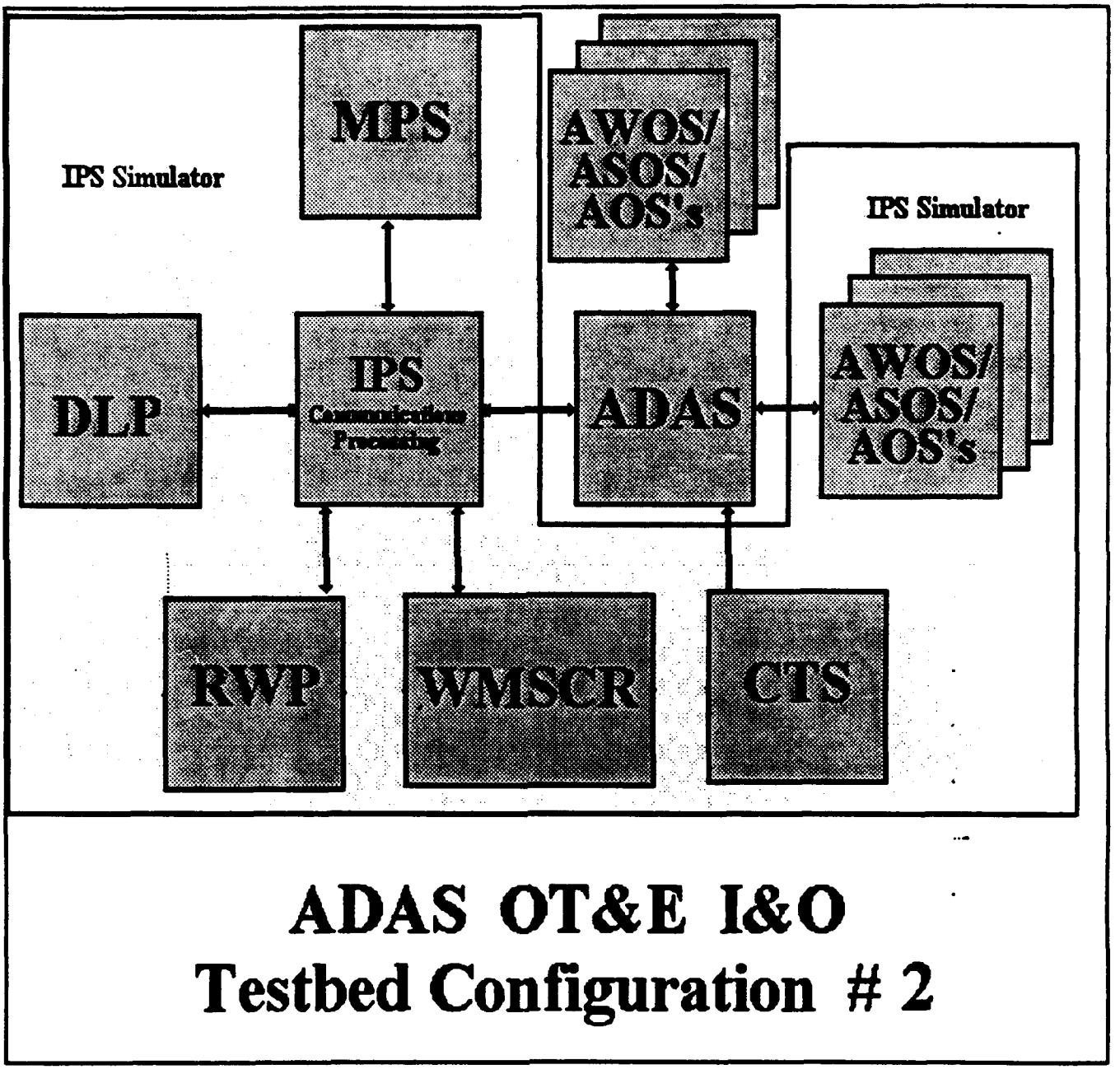

FIGURE C-2. ADAS OT&E TESTBED CONFIGURATION 2 (ADAS_ITC_2)

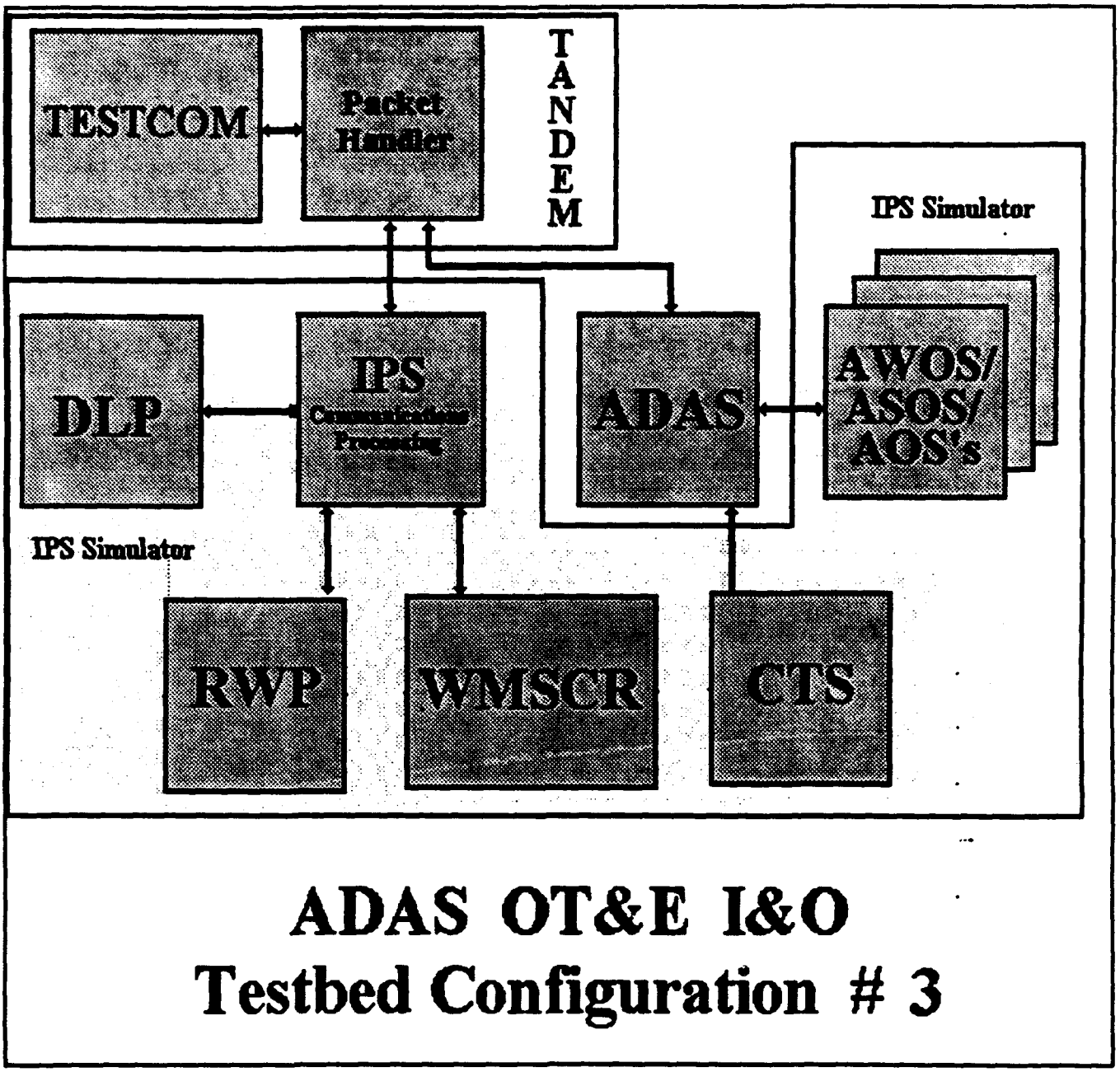

FIGURE C-3. ADAS OT&E TESTBED CONGIGURATION 3 (ADAS_ITC_3)

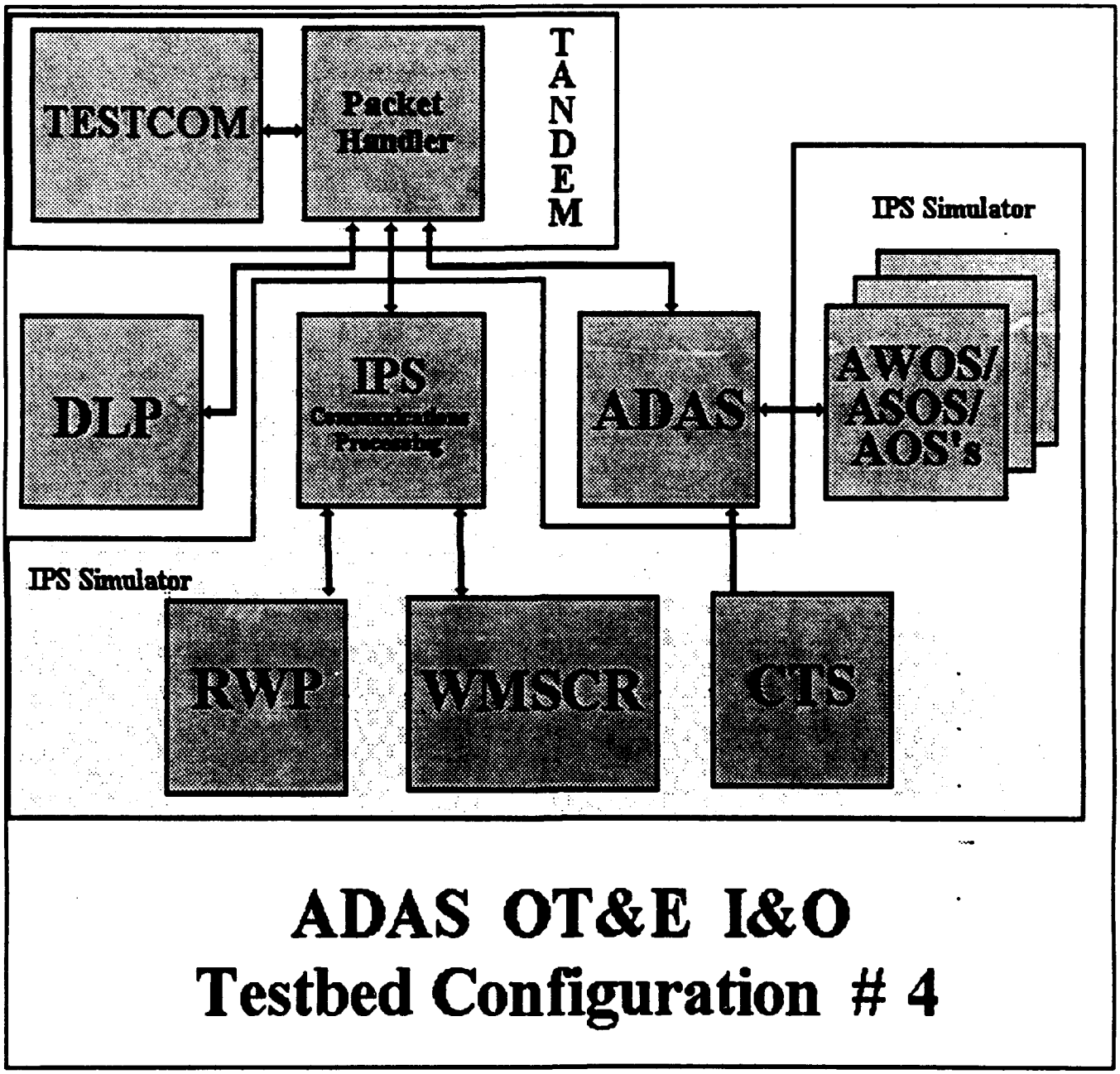

FIGURE C-4. ADAS OT&E TESTBED CONFIGURATION 4 (ADAS_ITC_4)

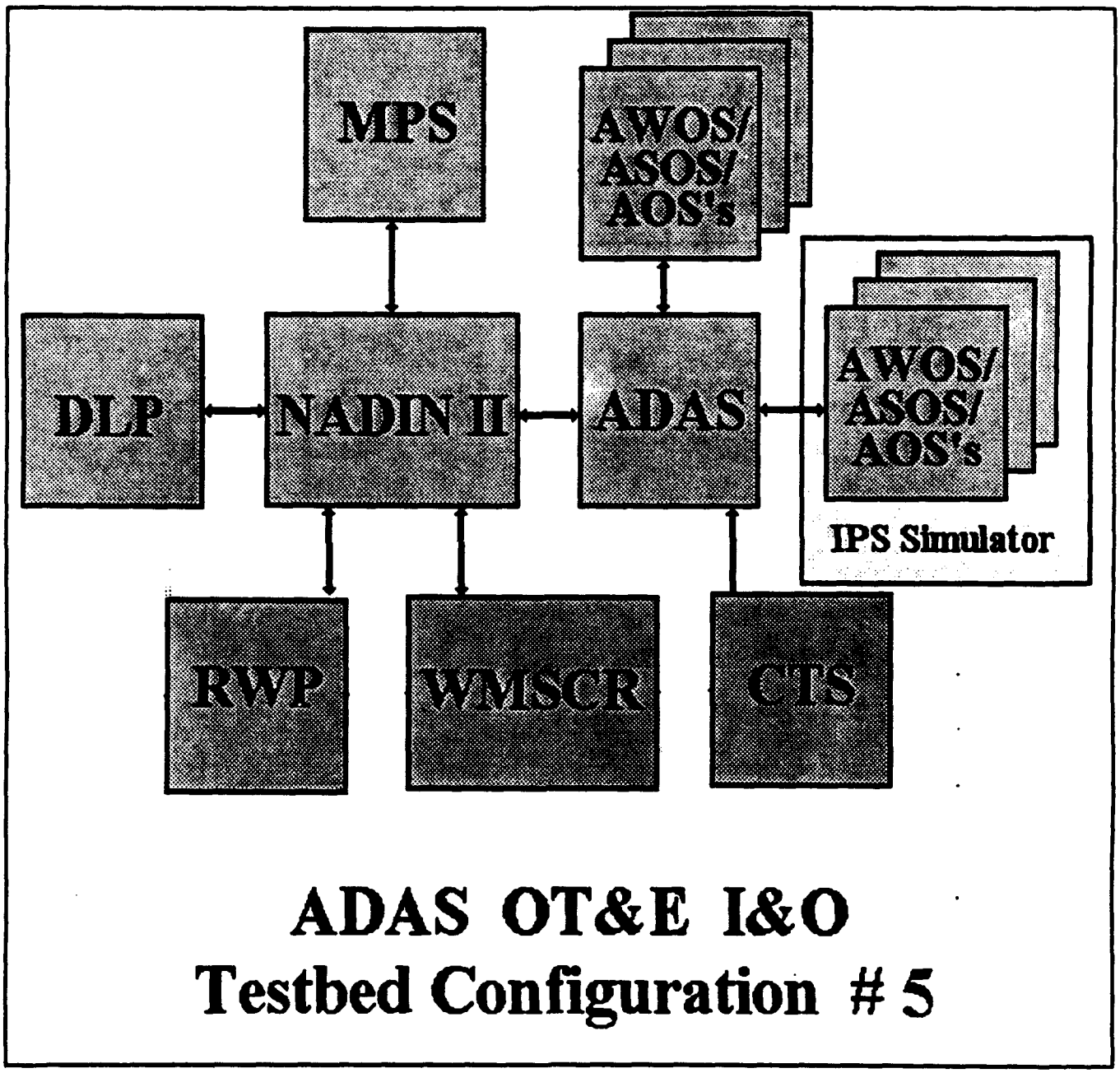

FIGURE C-5. ADAS OT&E TESTBED CONFIGURATION 5 (ADAS_ITC_5)

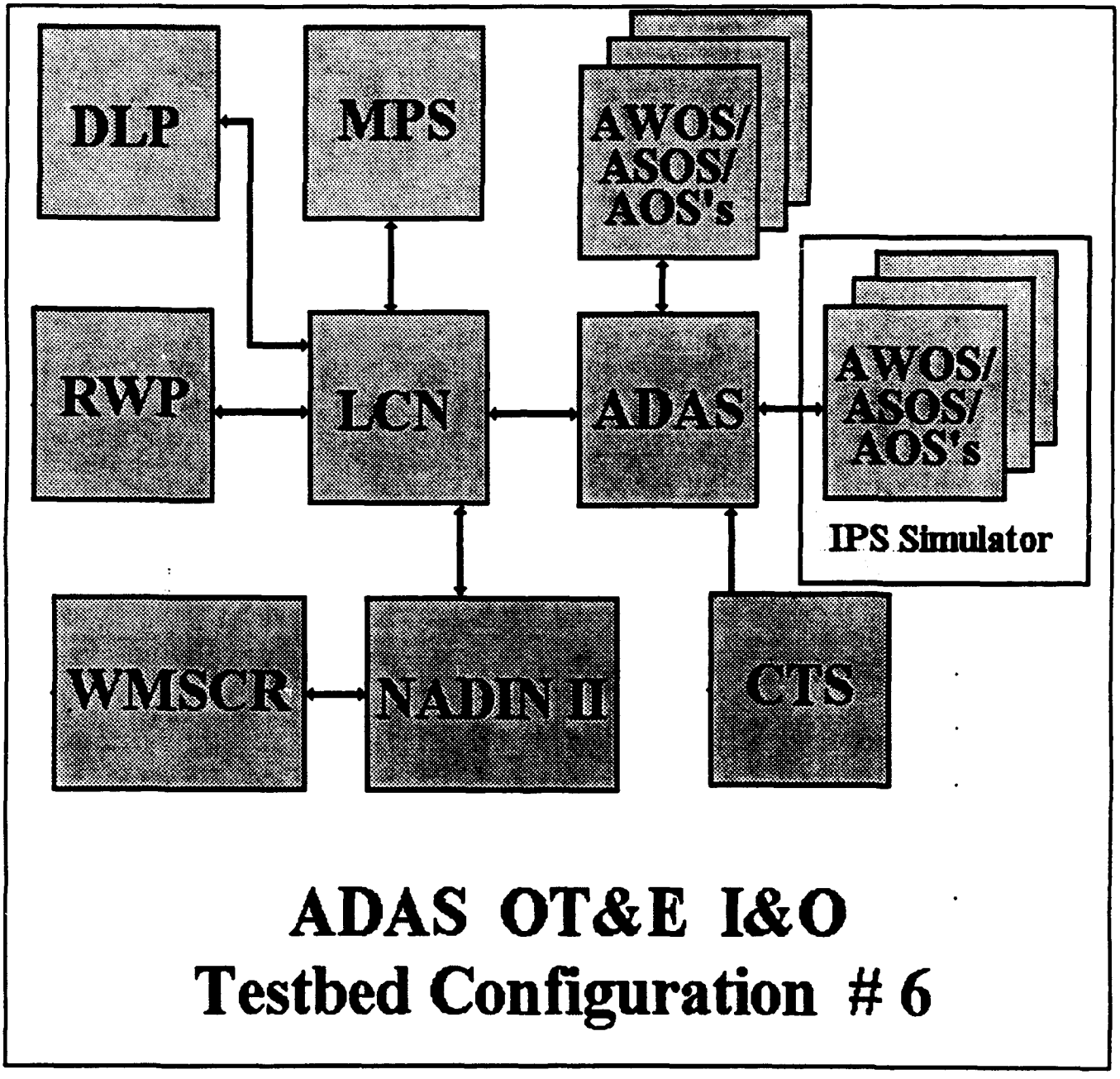

FIGURE C-6. ADAS OT&E TESTBED CONFIGURATION 6 (ADAS_ITC_6)

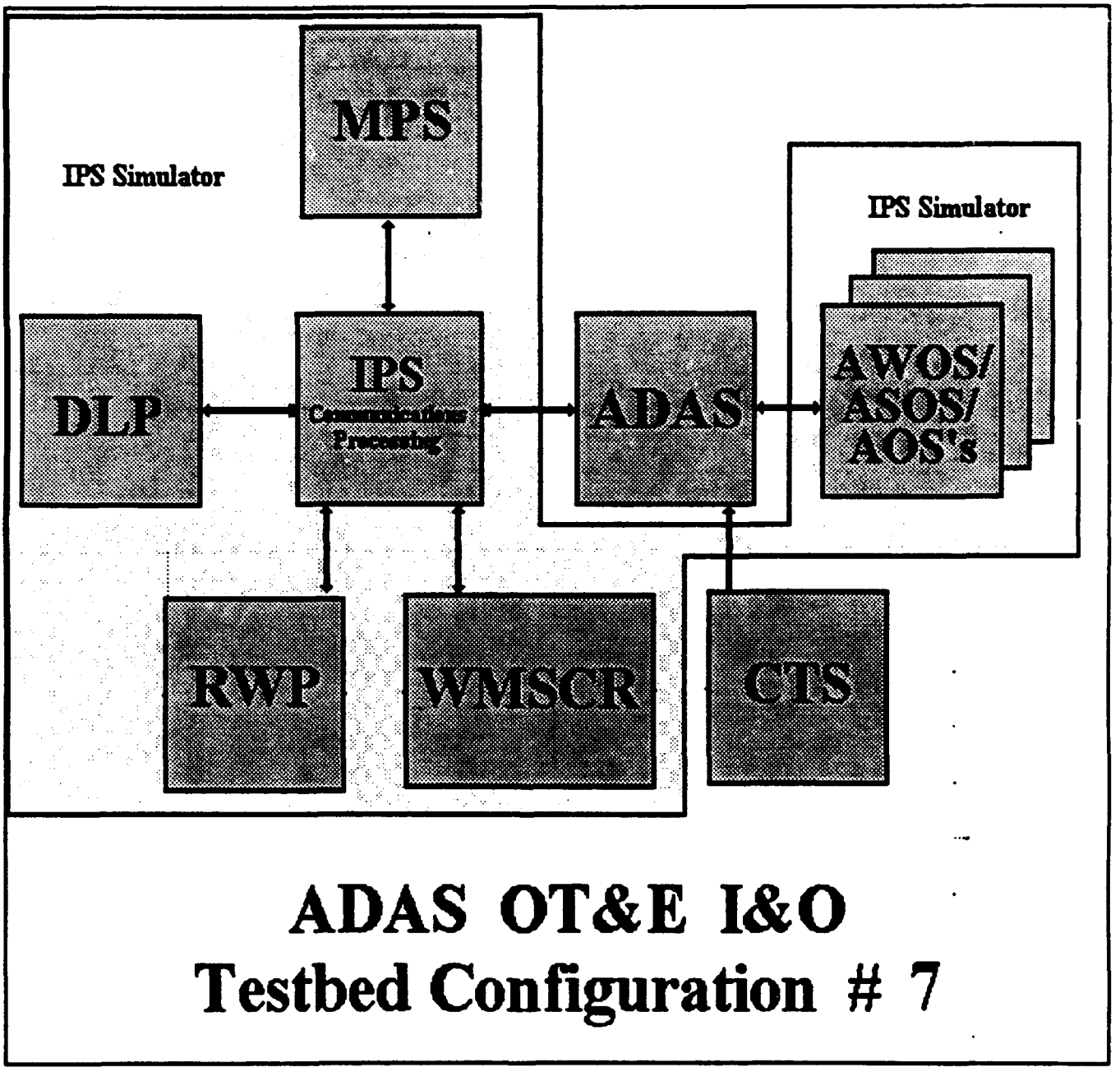

FIGURE C-7. ADAS OT&E TESTBED CONFIGURATION 7 (ADAS_ITC_7)

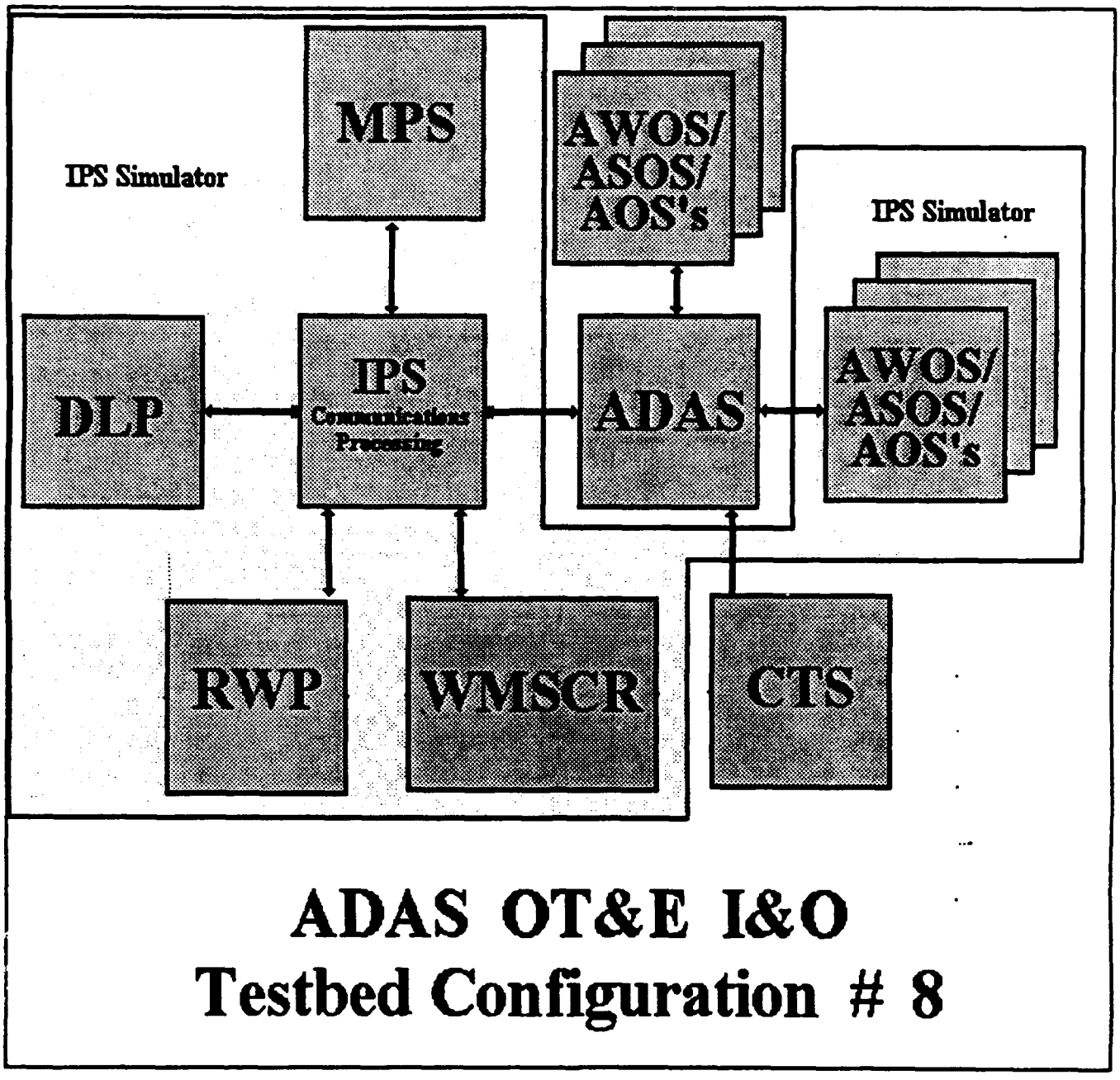

FIGURE C-8. ADAS OT&E TESTBED CONFIGURATION 8 (ADAS_ITC_8)

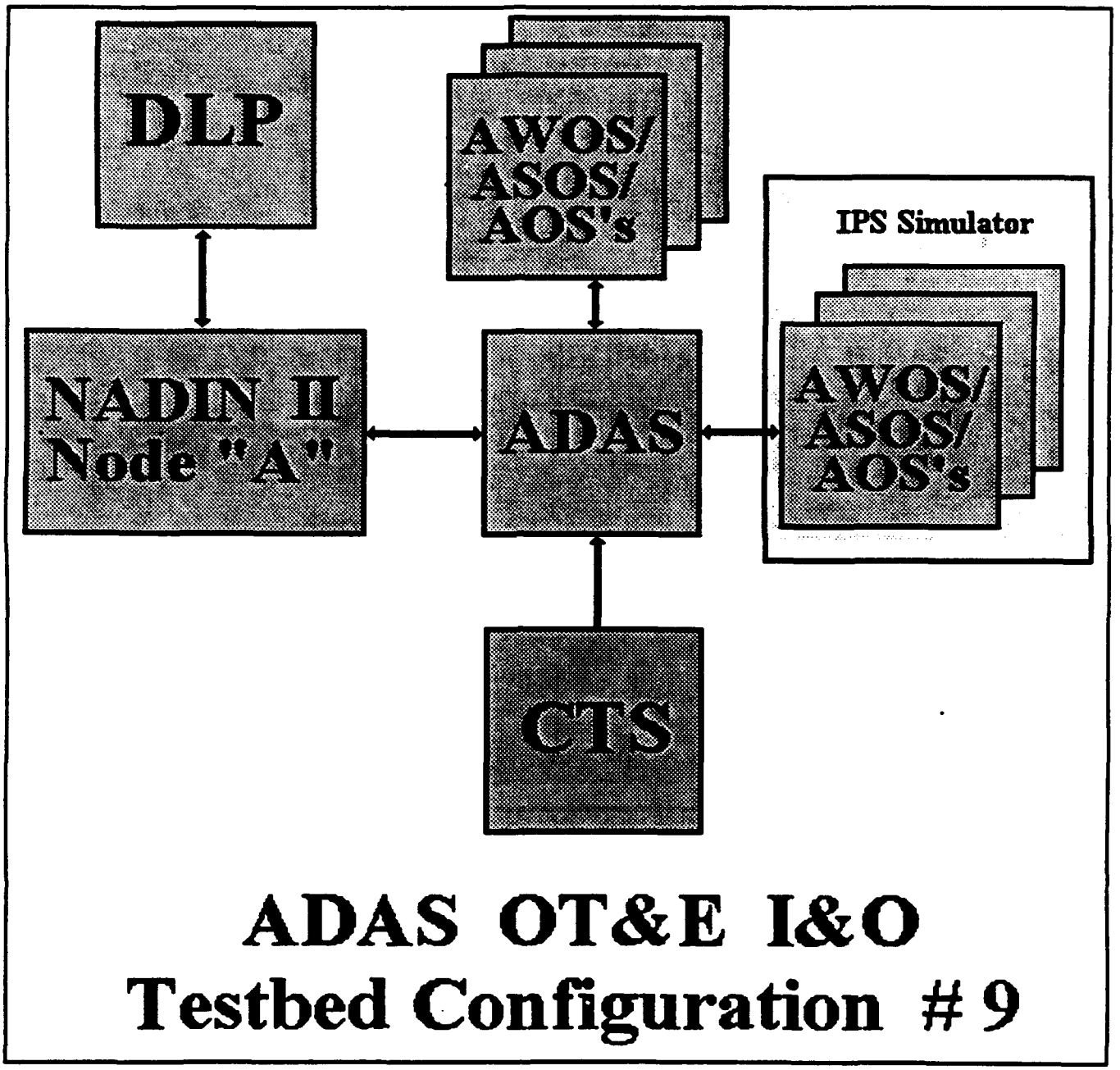

FIGURE C-9. ADAS OT&E TESTBED CONFIGURATION 9 (ADAS_ITC_9)

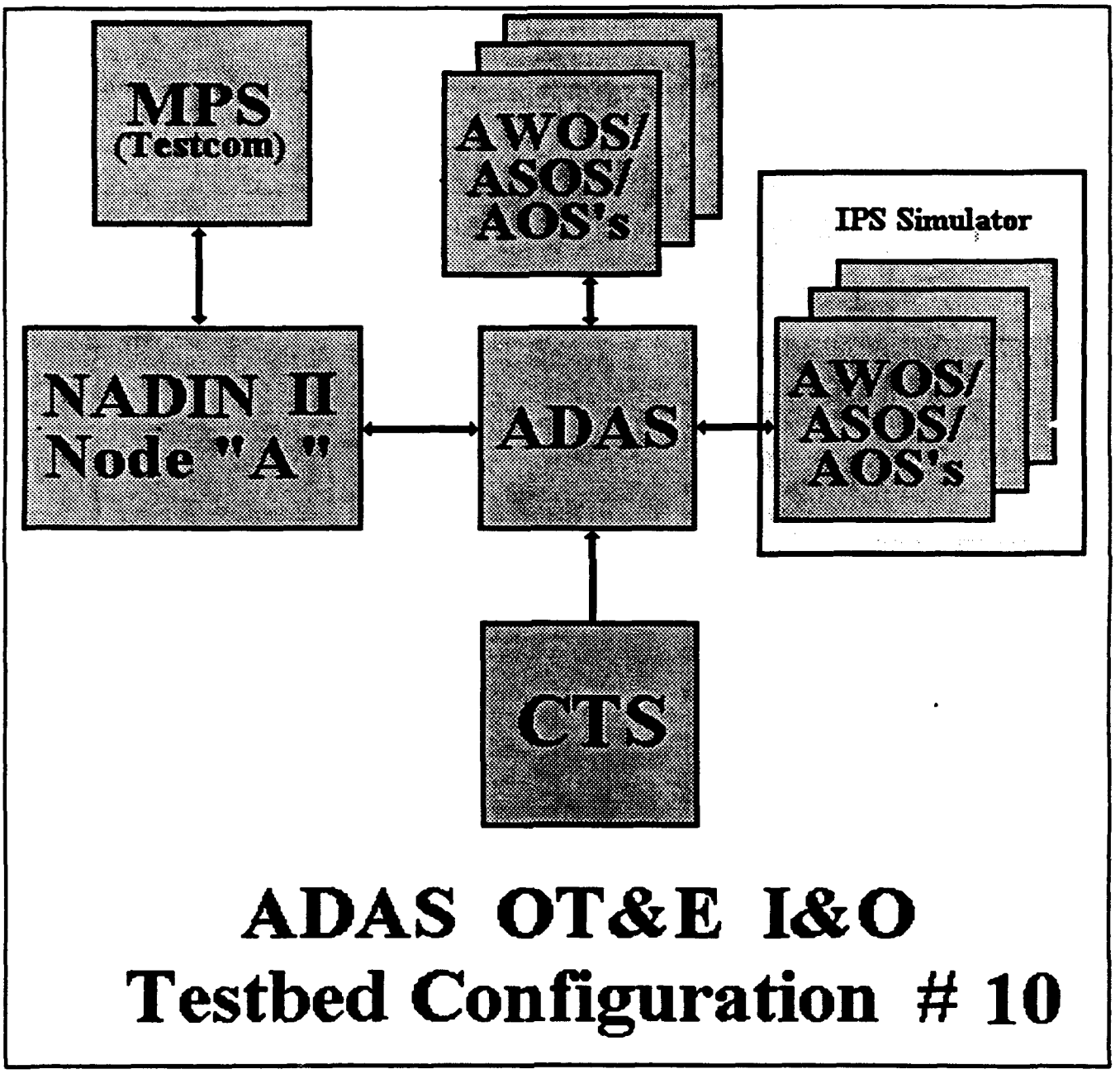

FIGURE C-10. ADAS OT&E TESTBED CONFIGURATION 10 (ADAS_ITC_10)

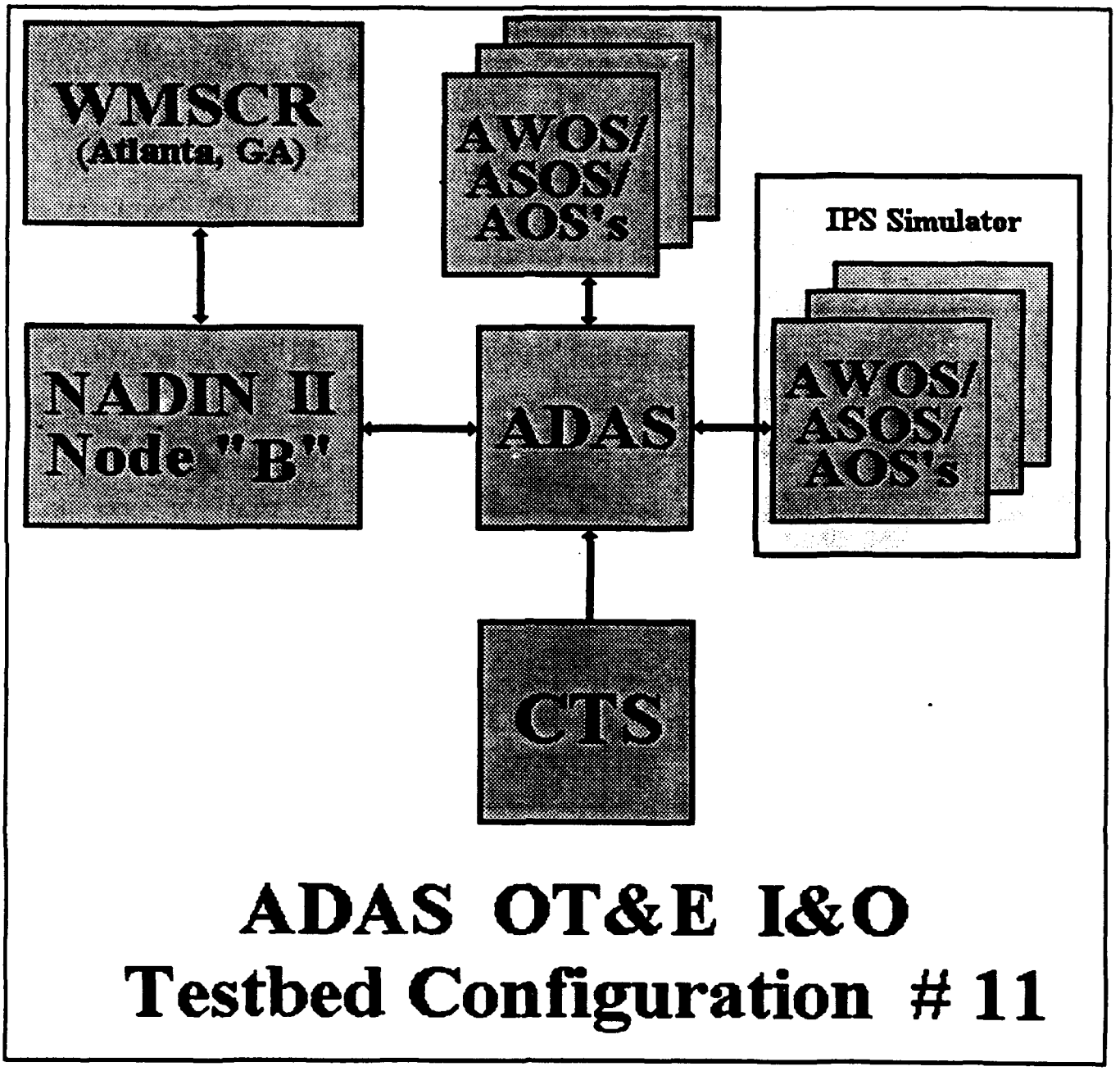

FIGURE C-11. ADAS OT&E TESTBED CONFIGURATION 11 (ADAS_ITC_11)

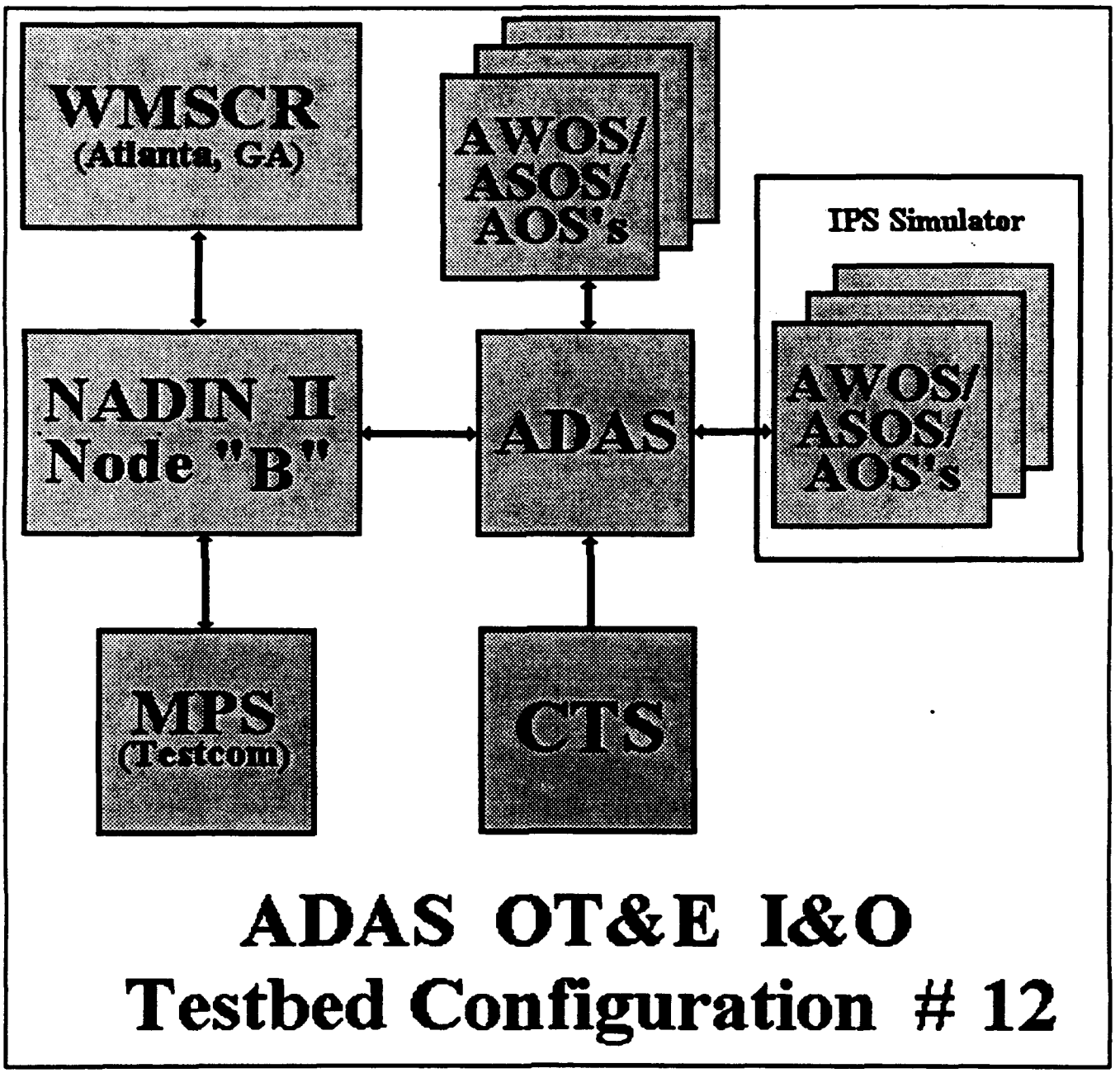

FIGURE C-12. ADAS OT&E TESTBED CONFIGURATION 12 (ADAS_ITC_12)

APPENDIX D

ADAS OT&E IPS TEST DATA

APPENDIX D. ADAS OT&E IPS TEST DATA.

This report makes extensive use of data captured by the IPS during the execution of the ADAS OT&E Test Procedures. A total of 37 files, containing over 16 megabytes data were captured for use in the verification of the ADAS NAS-SS-1000 requirements. After converting the files from UNIX ASCII to DOS ASCII format, the file were imported into Word Perfect and formatted for use. The test data files consist of 6372 pages of formatted data. These files are available from ACW-200A in electronic form. A listing of the data files follows:

```
b2iall.itd      780620   7-24-93   1:59p B2 IPS IML : ALL Msgs
b2isimev.itd      3168   7-24-93   1:59p B2 IPS IML : SIM: Event Log
b2iwsao.itd       1802   7-24-93   1:59p B2 IPS IML : WMSCR SAO Msgs
b2stat.itd        5179   7-24-93   1:59p B2 IPS Test Statistics
b3idlpa.itd    4908201   7-24-93   1:59p B3 IPS IML : DLP AWOS Msgs
b3iwsao.itd     171667   7-24-93   1:59p B3 IPS IML : WMSCR SAO Msgs
b3stat.itd       63430   7-24-93   1:59p B3 IPS Test Statistics
cliall.itd      763338   7-25-93   1:24a C1 IPS IML : All Msgs
cliwsao.itd      12163   7-24-93   1:59p C1 IPS IML : WMSCR SAO Msgs
cloall.itd       58565   7-25-93   1:35a C1 IPS OML : All Msgs
cloawos.itd      47258   7-24-93   1:59p C1 IPS OML : AWOS Msgs
clstat.itd        5378   7-25-93   1:38a C1 IPS Test Statistics
c2iwsao.itd      10012   7-24-93   1:59p C2 IPS IML : WMSCR SAO Msgs
c2oawos.itd     132738   7-24-93   1:59p C2 IPS OML : AWOS Msgs
c2stat.itd        4873   7-24-93   1:59p C2 IPS Test Statistics
c3iwsao.itd      12849   7-24-93   1:59p C3 IPS IML WMSCR SAO Msgs
c3oawos.itd      49664   7-24-93   1:59p C3 IPS OML : AWOS Msgs
c3stat.itd        4873   7-24-93   1:59p C3 IPS Test Statistics
c5iwsao.itd       7458   7-24-93   1:59p C5 IPS IML : WMSCR SAO Msgs
c5oawos.itd      46655   7-24-93   1:59p C5 IPS OML : AWOS Msgs
c5stat.itd        4873   7-24-93   1:59p C5 IPS Test Statistics
dliall.itd     1310388   7-24-93   1:59p D1 IPS IML : ALL Msgs
dliwsao.itd      25874   7-24-93   1:59p D1 IPS IML : WMSCR SAO Msgs
dloawos.itd     247131   7-24-93   1:59p D1 IPS OML : AWOS Msgs
dlstat.itd        7101   7-24-93   1:59p D1 IPS Test Statistics
d2iall.itd      949537   7-24-93   1:59p D2 IPS IML : All Msgs
d2idlp.itd      691775   7-24-93   1:59p D2 IPS IML : DLP AWOS Msgs
d2iwsao.itd      10016   7-24-93   1:59p D2 IPS IML : WMSCR SAO Msgs
d2oawos.itd     132268   7-24-93   1:59p D2 IPS OML : AWOS Msgs
d2stat.itd        5195   7-25-93   1:01p D2 IPS Test Statistics
d3iwsao.itd      23515   7-24-93   1:59p D3 IPS IML : WMSCR SAO Msgs
d3stat.itd        4873   7-24-93   1:59p D3 IPS Test Statistics
d4iwsao.itd      31946   7-24-93   1:59p D4 IPS IML : WMSCR SAO Msgs
d4stat.itd        4873   7-24-93   1:59p D4 IPS Test Statistics
elisal.itd       55961   7-25-93   1:40a E2 IPS IML : SIM: Archive Data
eliwsao.itd      41898   7-24-93   1:59p E1 IPS IML : WMSCR SAO Msgs
elstat.itd        4873   7-24-93   1:59p E1 IPS Test Statistics
```